All Wood Recycling
STORM DRAINAGE REPORT

Project Location:
8504 192nd Avenue NE
Redmond, Washington 98052

Prepared For:
All Wood Recycling
8504 192nd Avenue NE
Redmond, Washington 98052
(206) 682-5735

Prepared By:
Andrew Reaves, P.E.
Site Development Associates
1724 West Marine View Dr. , Ste 140
Everett, WA 98201
(425) 486-6533

Date:
February 27, 2013
(revised May 8, 2013)

Project Number:
102-009-10

All Wood Recycling
Storm Drainage Report

Project Location:
8504 192nd Avenue NE
Redmond, Washington 98052

Prepared For:
All Wood Recycling
8504 192nd Avenue NE
Redmond, Washington 98052
(206) 682-5735

Prepared By:
Site Development Associates
1724 West Marine View Dr., Ste. 140
Everett, WA 98201
(425) 486-6533

Date:
February 27, 2013
(Revised May 8, 2013)

Project Number:
102-009-10

TABLE OF CONTENTS

SECTION 7 – MINIMUM REQUIREMENT #6: RUNOFF TREATMENT

- Discussion of Water Quality Treatment Design

SECTION 8 – MINIMUM REQUIREMENT #7: FLOW CONTROL

- Existing Site Hydrology Synopsis
- Developed Site Hydrology Synopsis
- Flow Control Performance Standards
- Existing Drainage Basin Exhibit
- Proposed South Drainage Basin Exhibit
- Proposed North Drainage Basin Exhibit

- Appendix 8-A – WWHM3 Flow Control Design Calculations
- Appendix 8-B – Pump Design Calculations

SECTION 9 – MINIMUM REQUIREMENT #8: WETLANDS PROTECTION

SECTION 10 – MINIMUM REQUIREMENT #9: BASIN/WATERSHED PLANNING

SECTION 11 – MINIMUM REQUIREMENT #10: OPERATION AND MAINTENANCE

SECTION 12 – SPECIAL REPORTS AND STUDIES

- Appendix 12-A – Geotechnical Report

SECTION 1

EXECUTIVE SUMMARY

PROJECT OVERVIEW

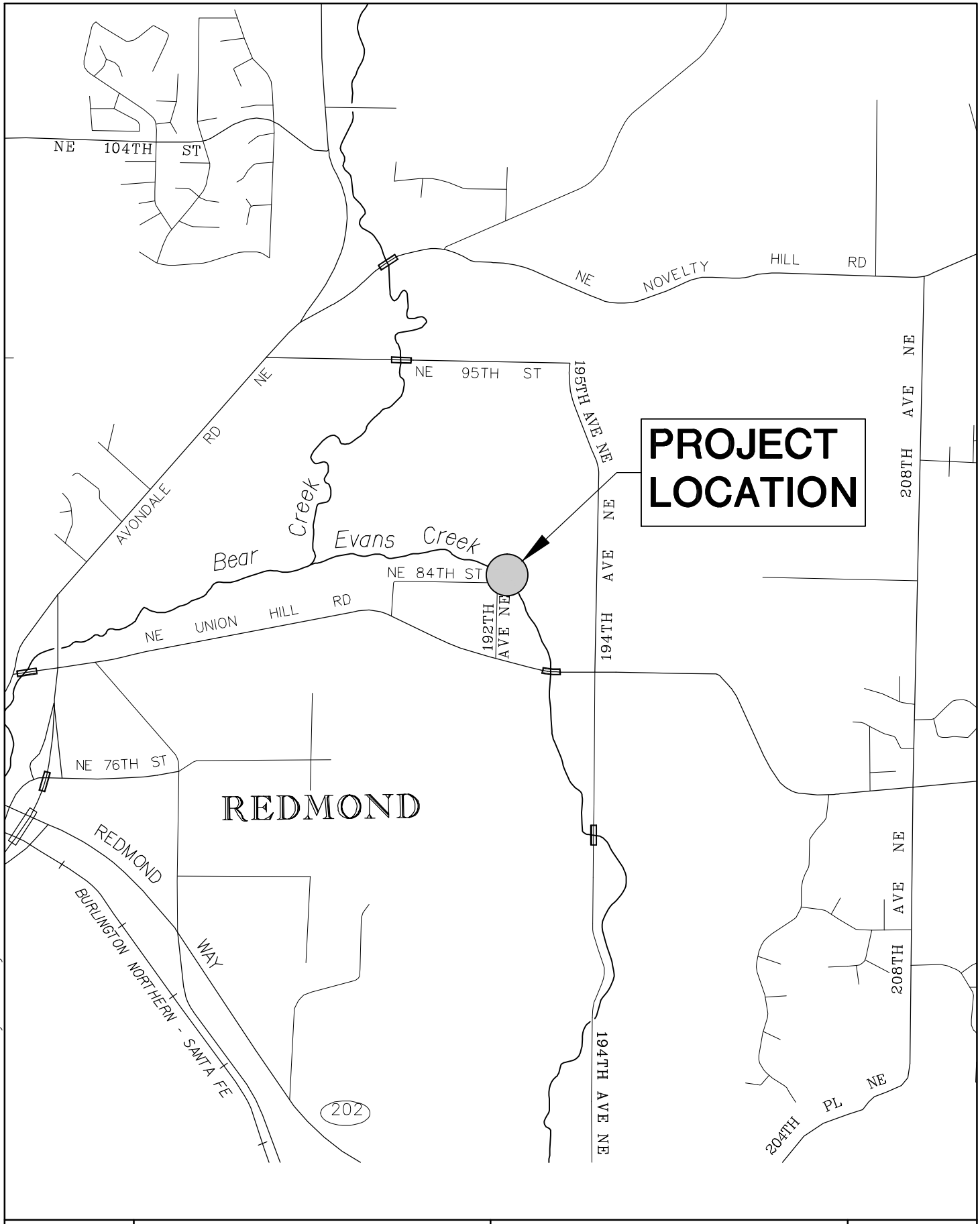
All Wood Recycling is a wood, concrete and asphalt recycling company occupying 4.77 acres in eastern Redmond. It is an existing use and company that has been operating on the property for approximately 18 years. This report is an analysis of the existing drainage system. The site lies in the SE ¼ of Section 6, Township 25North, Range 6 East, W.M. More specifically, the project lies at 8504 192nd Avenue, NE, Redmond Washington. A vicinity map has been provided as **Figure 1** of this document.

The project site occupies City of Redmond County, Tax Lot #062506 9044. The site is covered in impervious surface, with Evans Creek bisecting the site, flowing from the SE to the NW. The topography of the site can generally be described as flat as it is on a plateau of structural fill to the north of Evans Creek placed some decades ago, at a depth of approximately 15', and native Puget soils to the south. The slopes off of the fill plateau into the Evans Creek channel are quite step in places, at a slope of 100% at the steepest.

Stormwater runoff from the project site currently flows thru a series of pipes, catch basins, and overland flow into a water quality wet vault, from the wet vault into an oil water separator, and then into a pump chamber manhole where flows are pressurized up into a 5000 gallon holding tank, then pressurized again thru a force main out of the holding tank and across the creek into a permitted class 5 injection well (infiltration trench).

Proposed drainage improvements include relocation of the existing above ground tank (currently inside the 25' natural Evans Creek buffer) to be outside the buffer. Then the pump in the above ground tank will be upsized to provide adequate pressure and flow to the proposed new bioinfiltration pond. This pond is proposed to be located on the North side of the creek in the eastern portions of the site. The pond is needed to provide enhanced treatment of the runoff from the site. The pond will infiltrate the 50 year storm from the continuous model WWHM3, and release the remainder of the flows in an overflow pipe into the adjacent wetlands. The 50 year storm is what was required by the shoreline permit approval and SEPA, with the existing basin modeled as old growth forest, type C soils. A drainage basin figure has been included as **Figure 2** of this report.

A flowchart of minimum requirements has been included as **Figure 3** of this report. The flowchart indicates that only minimum requirements #1 through #5 are required, but due to the history and complexity of this project, and the removal of the existing infiltration system, ***all ten minimum requirements*** have been addressed.



Feb 27, 2013 - 8:15AM Last Saved By: KMcIntyre

ACR Design JDZ Drawn 12/28/2010 Date 102-009-10 Project No.	SDA Civil Engineering, Project Management, Planning 10024 Main Street, Suite 2A; Bothell, Washington 98011 Office: 425.486.6533 Fax: 425.486.6593 www.sdaengineers.com	ALL WOOD RECYCLING VICINITY MAP	N.T.S. Scale 1 Figure No.

R:\Projects\102 (Parnell)\009-10 (All Wood)\Dwg\figures\TIR Figures\AL-vicinity map.dwg

RETAINING WALL
STOCKPILE AREA
CONC. DIVIDERS FOR STOCKPILES
COMPACTED GRAVEL, ASPHALT AND CONCRETE
RETAINING WALL
FLOW
SD
INJECTION WELL RIM EL=64.72 IE=59.72
PUMP LINE (APPROX LOC.)
APPROXIMATE LOCATION OF DRAIN LINES.
STOCKPILE AREA
EXISTING BUILDING
CONC
1 STORY WOOD FRAME HOUSE #8504
TBM-B
EVANS CREEK
EXISTING TREATMENT TANK
ALLWOOD RECYCLING
JOB NO. 07198
TAX LOT NO. 062506904408
TRIBUTARY PROJECT BASIN
1.80 AC
PROPOSED BIOINFILTRATION POND
0.29 AC
APPROX. LOCATION 12" WATER MAIN
BUILDING
30.00'
30.01'
114.61'
54
60
64

N

0 50

1"=50'

Feb 27, 2013 - 8:23AM Last Saved By: GRimando

KJM Design KJM Drawn 02-26-13 Date 102-009-10 Project No.	SDA CVil Engineering Project Management Planning 1724 W. Marine View Drive, Suite 140; Everett, Washington 98201 Office: 425.486.6533 Fax: 425.486.6593 www.sdaengineers.com	**ALL WOOD RECYCLING** PROJECT BASIN MAP	Sheet: FIG 2

R:\Projects\102 (Parnell)\009-10 (All Wood)\Dwg\figures\TIR Figures\AL-Basin Exhibit.dwg 11x17

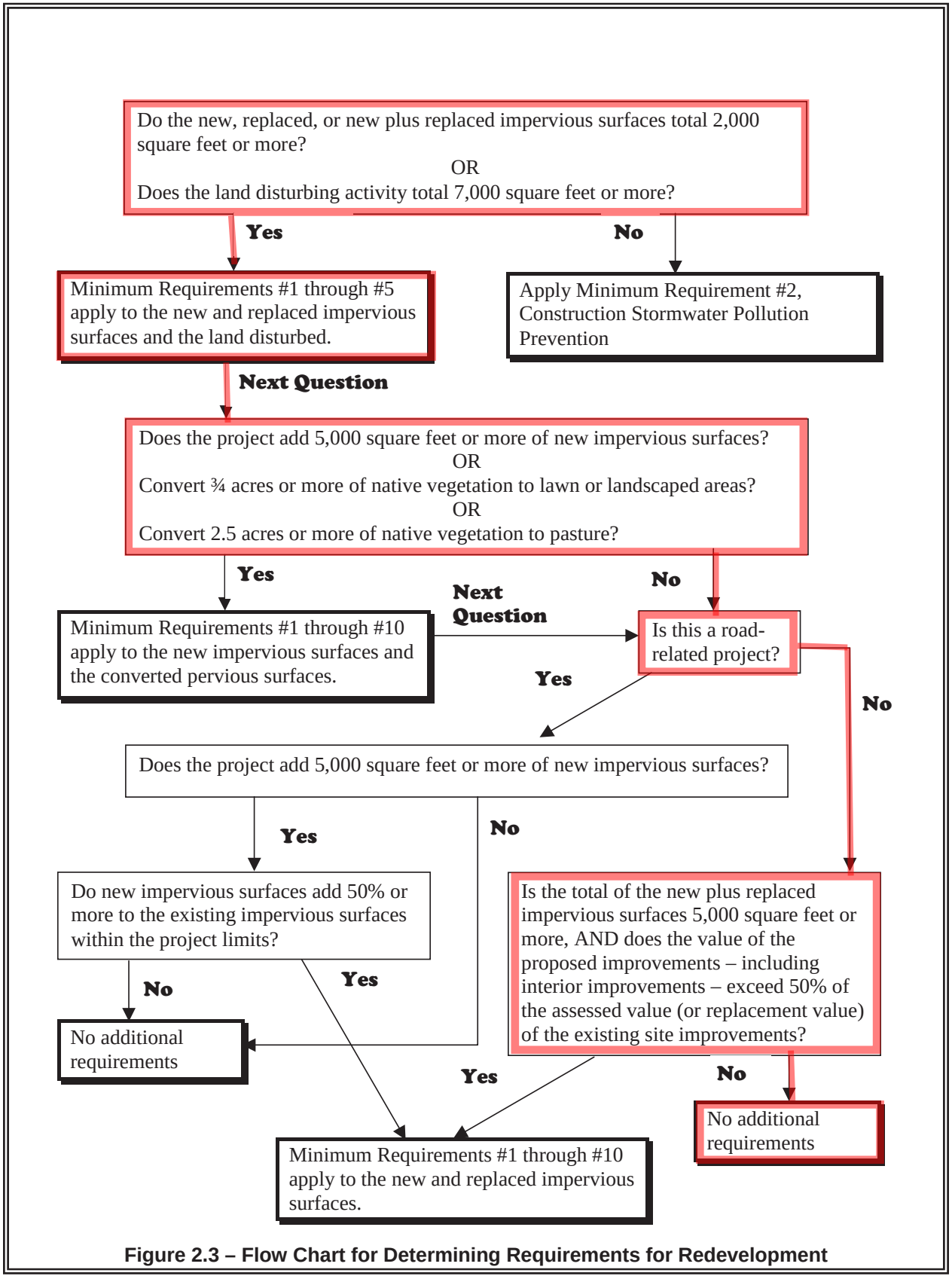


Figure 2.3 – Flow Chart for Determining Requirements for Redevelopment

FIGURE 3 - MINIMUM REQUIREMENTS FLOWCHART

SECTION 2

MINIMUM REQUIREMENT #1

PREPARATION OF STORMWATER SITE PLANS

STORMWATER SITE PLANNING PROCESS

The City of Redmond has adopted the 2005 Washington State Department of Ecology Stormwater management Manual for the Puget Sound Basin as the governing design document for surface runoff control. The following is a listing of the applicable minimum "core" and "special" requirements outlined in Chapter 1 of the manual, with a brief description of how each was addressed:

- ***Step 1: Collect and Analyze Information on Existing Conditions***

  Stormwater runoff from the project site currently flows thru a series of pipes, catch basins, and overland flow into a water quality wet vault, from the wet vault into an oil water separator, and then into a pump chamber manhole where flows are pressurized up into a 5000 gallon holding tank, then pressurized again thru a force main out of the holding tank and across the creek into a permitted class 5 injection well (infiltration trench).

  The project site lies in the City of Redmond, occupying King County Tax Lot #062506 9044. The site is covered in impervious surface, with Evans Creek bisecting the site, flowing from the SE to the NW. The topography of the site can generally be described as flat as it is on a plateau of structural fill to the north of Evans Creek placed some decades ago, at a depth of approximately 15', and native Puget soils to the south. The slopes off of the fill plateau into the Evans Creek channel are quite step in places, at a slope of 100% at the steepest.

- ***Step 2: Prepare a Preliminary Development Layout***

  Proposed drainage improvements include relocation of the existing above ground tank (currently inside the 25' natural Evans Creek buffer) to be outside the buffer. The pump in the above ground tank will be upsized to provide adequate pressure and flow to the proposed bioinfiltration pond. This pond is proposed to be located on the North side of the creek in the eastern portions of the site. The pond is needed to provide enhanced treatment of the runoff from the site. The pond has been designed to fully infiltrate runoff, up to the 50-yr peak design flowrate, as calculated from the WWHM stormwater model. An emergency overflow structure will be provided to discharge excess flows to the adjacent wetlands.

- ***Step 3: Perform Offsite (Upstream and Downstream) Analysis***

  There are some small upstream basins to the site that is a portion of the project frontage on 192nd. The basin is very small (>.1 ac) and is shown on the basin map for the site. This upstream basin is also included into the infiltration and treatment design for the site bioinfiltration pond.

  The downstream drainage course for this site is Evans Creek, which flows from the east to the west thru the middle of the site. There are associated wetlands to the north and east of the site that eventually flow into Evans Creek.

- ***Step 4: Determine Applicable Minimum Requirements***

  The site is draining 2.09 acres, but only disturbing approximately 14,000 s.f. This includes the areas next to the creek to be restored, and the bioinfiltration pond. Section 3 of this report, along with the attached Temporary Erosion & Sediment Control (TESC) plans will serve as the SWPPP for this project. The site is in the wellhead protection area, the entire 2.09 acres will be treated and infiltrated on the site, for flowrates up to the 50-year design event.

- ***Step 5: Prepare a Permanent Stormwater Control Plan***

  Surface runoff from the site is currently collected into an underground vault with multiple treatment mechanisms. Water discharged from the vault is pumped to an above-ground storage tank, then pumped again to an underground injection well on the north side of Evans Creek.

  The proposed design will relocate the above-ground tank outside of the 25' Evans Creek buffer. It will remain on-site, but will be taken off-line from the stormwater management system. The project will then install a new discharge pump at the downstream end of the treatment vault, with sufficient capacity to convey the full 50-yr peak runoff rate. This pump will direct discharge through a 4-inch force main, directly to a new bioinfiltration pond on the north side of Evans Creek. The pond will provide enhanced treatment of stormwater runoff, and has been sized to fully infiltrate the 50-year peak design storm event.

- ***Step 6: Prepare a Stormwater Pollution Prevention Plan (SWPPP)***

  Section 3 of this report, along with the attached Temporary Erosion & Sediment Control (TESC) plans are intended to serve as the SWPPP for this project.

- ***Step 7: Complete the Stormwater Site Plan***

  The stormwater site plan will be very similar to the plan developed at the preliminary stages of the project, as outlined above in step 5..

Conveyance System

The conveyance proposed for this project consists of a pump and force main, to convey runoff from the underground treatment vault to the bioinfiltration pond. The pump has been designed to convey the peak flowrate for the 50-yr design storm event. A 4-inch ductile iron force main will be installed to convey stormwater from the vault to a catch basin immediately upstream of the bioinfiltration pond. The catch basin is intended to serve as an energy break to reduce the potential for erosion in the pond. A short pipe section will convey runoff from the catch basin to the bioinfiltration facility.

A hydrologic analysis for the site has been provided in Appendix 8-A of this report, and includes the design flowrates for the force main system. Pump sizing calculations have been provided in Appendix 8-B.

SECTION 3

MINIMUM REQUIREMENT #2

CONSTRUCTION STORMWATER POLLUTION PREVENTION (SWPPP)

A Stormwater Pollution Prevention Plan (SWPPP) is required to address 12 specific pollution prevention elements per SCC 30.63A. These elements are listed and summarily addressed below, A full SWPPP is included in appendix 3-A.

1. Mark Clearing Limits

Clearing limits will be flagged or fenced by the contractor or project surveyor prior to commencement of construction activity.

2. Establish Construction Access

The site entrance is currently paved and will act as the construction entrance for equipment and material.

3. Detain Flows

The project drainage will be allowed to function as existing utilizing the injection well. When the pond is complete and stabilized, the injection well will be decommissioned..

4. Install Sediment Controls

Filter fabric fencing (silt fence) shall be installed around the downstream perimeter of the site in order to keep sediment-laden stormwater from leaving the site. The fencing shall be inspected periodically to ensure its continued effectiveness.

5. Stabilize Soils

Exposed soils shall be stabilized through mulching or hydroseeding when the not actively worked for a significant period of time. Permanent vegetation shall be established through hydroseeding once the site has reached final grade.

6. Protect Slopes

The project calls for the installation of silt fences on the tops of all slopes where disturbance is proposed.

7. Protect Drain Inlets

The temporary erosion and sediment control plan calls for a filter fabric sock to be installed at all nearby catch basin inlets. Filter fabric protection shall be placed in all new catch basins as they are installed.

8. Stabilize Channels and Outlets

Water discharged from the sedimentation facility shall outfall onto a rip-rap splash pad or level spreader.

9. Control Pollutants

All waste materials shall be disposed of in an approved location, in accordance with City of Redmond Standards. In order to reasonably prevent a contamination event (such as a fuel spill), all major vehicle maintenance shall occur off-site to the greatest extent practicable. The contractor shall provide a vehicle staging area near the entrance to the site where all fueling and maintenance activity is likely to take place. This is intended to

contain the area in which a contamination event is likely to take place. The contractor shall immediately contain and clean-up an area in which a contamination event occurs. The existing infiltration system shall be decommissioned per Washington State Underground Injection Control (UIC) requirements.

10. Control De-Watering

No significant dewatering is expected to occur during this project.

11. Maintain BMPs

All BMPs should be monitored and maintained regularly to ensure adequate operation. A TESC supervisor shall be identified at the beginning of the project to provide monitoring and direct the appropriate maintenance activity. As site conditions change, all BMPs shall be updated as necessary to maintain compliance with City standards.

12. Manage the Project

The project will begin with a pre-construction conference in which an on-site TESC supervisor shall be identified. The on-site supervisor shall monitor all TESC facilities regularly and maintain a log of inspections and improvements to demonstrate compliance with City standards. It will be important that the entire site is in conformance with City of Redmond erosion control standards at all times. The TESC supervisor shall notify Site Development Associates of any problems with the proposed erosion control elements, or if any revisions to the plan need to be made. Additional erosion control materials, such as filter fabric fencing, cover plastic, and straw bales, shall be kept on-site at all times in the event that an erosion control feature needs to be replaced or installed.

APPENDIX 3-A

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

Stormwater Pollution Prevention Plan

For
All Wood Recycling

Prepared For
All Wood Recycling
8504 192nd Avenue NE
Redmond, WA 98053

Owner	Developer	Operator/Contractor
All Wood Recycling 8504 192nd Avenue NE Redmond, WA 98053	All Wood Recycling 8504 192nd Avenue NE Redmond, WA 98053	All Wood Recycling 8504 192nd Avenue NE Redmond, WA 98053

Project Site Location
8504 192nd Avenue NE
Redmond, WA 98053

Certified Erosion and Sediment Control Lead
Bill Helsley
4250486-6533

SWPPP Prepared By
Site Development Associates, LLC
1724 W. Marine View Dr., Suite 140
Everett, Washington 98201
Andrew Reaves, P.E.

SWPPP Preparation Date
November 13, 2012

Approximate Project Construction Dates
June 2013
November 2013

Contents

Appendix A Site plans

- Vicinity map
- Site plan with TESC measures

Appendix B Construction BMPs

- Possibly reference in BMPs, but likely it will be a consolidated list so that the applicant can photocopy from the list from the SWMM.

Appendix C Alternative Construction BMP list

- List of BMPs not selected, but can be referenced if needed in each of the 12 elements

Appendix D General Permit

Appendix E Site Log and Inspection Forms

Appendix F Engineering Calculations

1.0 Introduction

This stormwater Pollution Prevention Plan (SWPPP) has been prepared as part of the Shoreline Substantial Development Permit issued for the All Wood Recycling project in the city of Redmond, Washington. The site is located at 8504 192nd Avenue NE in Redmond Washington. The existing site is made up of 1 parcel totaling 4.77 acres. The existing parcel contains several structures, all of which are to remain, and for the purposes of stormwater, are not affected by this proposal or have any bearing on the drainage design or erosion control measures. The proposed development consists

All Wood Recycling is a wood, concrete and asphalt recycling company occupying 4.77 acres in eastern Redmond. It is an existing use and company that has been operating on the property for approximately 18 years. This report is an analysis of the existing drainage system. The site lies in the SE ¼ of Section 6, Township 25North, Range 6 East, W.M. More specifically, the project lies at 8504 192nd Avenue, NE, Redmond Washington. A vicinity map has been provided as **Figure 1** of this document.

The project site occupies City of Redmond County, Tax Lot #062506 9044. The site is covered in impervious surface, with Evans Creek bisecting the site, flowing from the SE to the NW. The topography of the site can generally be described as flat as it is on a plateau of structural fill to the north of Evans Creek placed some decades ago, at a depth of approximately 15', and native Puget soils to the south. The slopes off of the fill plateau into the Evans Creek channel are quite step in places, at a slope of 100% at the steepest.

Stormwater runoff from the project site currently flows thru a series of pipes, catch basins, and overland flow into a water quality wet vault, from the wet vault into an oil water separator, and then into a pump chamber manhole where flows are pressurized up into a 5000 gallon holding tank, then pressurized again thru a force main out of the holding tank and across the creek into a permitted class 5 injection well (infiltration trench).

Proposed drainage improvements include relocation of the existing above ground tank (currently inside the 25' natural Evans Creek buffer) to be outside the buffer. Then the pump in the above ground tank will be upsized to provide adequate pressure and flow to the proposed new bioinfiltration pond. This pond is proposed to be located on the North side of the creek in the eastern portions of the site. The pond is needed to provide enhanced treatment of the runoff from the site. The pond will infiltrate 91% of the flows from the continuous model WWHM3, and release the remainder of the flows in an overflow pipe into the adjacent wetlands. The release rates will be at or below the allowable release rates, with the existing basin modeled as old growth forest, type C soils.

The purpose of this SWPPP is to describe the proposed construction activities and all temporary and permanent erosion and sediment control (TESC) measures, pollution prevention measures, inspection/monitoring activities, and recordkeeping that will be implemented during the proposed construction project. The objectives of the SWPPP are to:

1. Implement Best Management Practices (BMPs) to prevent erosion and sedimentation, and to identify, reduce, eliminate or prevent stormwater contamination and water pollution from construction activity.

2. Prevent violations of surface water quality, ground water quality, or sediment management standards.

3. Prevent, during the construction phase, adverse water quality impacts including impacts on beneficial uses of the receiving water by controlling peak flow rates and volumes of stormwater runoff at the Permittee's outfalls and downstream of the outfalls.

This SWPPP was prepared using the Ecology SWPPP Template downloaded from the Ecology website on April 13, 2007. This SWPPP was prepared based on the requirements set forth in the Construction Stormwater General Permit, *Stormwater Management Manual for Western Washington* (SWMMWW 2005) and in the *Stormwater Management Manual for Eastern Washington* (SWMMEW 2004). The report is divided into seven main sections with several appendices that include stormwater related reference materials. The topics presented in the each of the main sections are:

- Section 1 – INTRODUCTION. This section provides a summary description of the project, and the organization of the SWPPP document.

- Section 2 – SITE DESCRIPTION. This section provides a detailed description of the existing site conditions, proposed construction activities, and calculated stormwater flow rates for existing conditions and post–construction conditions.

- Section 3 – CONSTRUCTION BMPs. This section provides a detailed description of the BMPs to be implemented based on the 12 required elements of the SWPPP (SWMMEW 2004).

- Section 4 – CONSTRUCTION PHASING AND BMP IMPLEMENTATION. This section provides a description of the timing of the BMP implementation in relation to the project schedule.

- Section 5 – POLLUTION PREVENTION TEAM. This section identifies the appropriate contact names (emergency and non-emergency), monitoring personnel, and the onsite temporary erosion and sedimentation control inspector

- Section 6 – INSPECTION AND MONITORING. This section provides a description of the inspection and monitoring requirements such as the parameters of concern to be monitored, sample locations, sample

frequencies, and sampling methods for all stormwater discharge locations from the site.

- Section 7 – RECORDKEEPING. This section describes the requirements for documentation of the BMP implementation, site inspections, monitoring results, and changes to the implementation of certain BMPs due to site factors experienced during construction.

Supporting documentation and standard forms are provided in the following Appendices:

Appendix A – Site plans
Appendix B – Construction BMPs
Appendix C – Alternative Construction BMP list
Appendix D – General Permit
Appendix E – Site Log and Inspection Forms
Appendix F – Engineering Calculations

2.0 Site Description

2.1 Existing Conditions

All Wood Recycling is a wood, concrete and asphalt recycling company occupying 4.77 acres in eastern Redmond. It is an existing use and company that has been operating on the property for approximately 18 years. This report is an analysis of the existing drainage system. The site lies in the SE ¼ of Section 6, Township 25North, Range 6 East, W.M. More specifically, the project lies at 8504 192nd Avenue, NE, Redmond Washington. A vicinity map has been provided as **Figure 1** of this document.

The project site occupies City of Redmond County, Tax Lot #062506 9044. The site is covered in impervious surface, with Evans Creek bisecting the site, flowing from the SE to the NW. The topography of the site can generally be described as flat as it is on a plateau of structural fill to the north of Evans Creek placed some decades ago, at a depth of approximately 15', and native Puget soils to the south. The slopes off of the fill plateau into the Evans Creek channel are quite step in places, at a slope of 100% at the steepest.

Stormwater runoff from the project site currently flows thru a series of pipes, catch basins, and overland flow into a water quality wet vault, from the wet vault into an oil water separator, and then into a pump chamber manhole where flows are pressurized up into a 5000 gallon holding tank, then pressurized again thru a force main out of the holding tank and across the creek into a permitted class 5 injection well (infiltration trench).

Proposed drainage improvements include relocation of the existing above ground tank (currently inside the 25' natural Evans Creek buffer) to be outside the buffer. Then the pump in the above ground tank will be upsized to provide adequate pressure and flow to the proposed new bioinfiltration pond. This pond is proposed to be located on the North side of the creek in the eastern portions of the site. The pond is needed to provide enhanced treatment of the runoff from the site. The pond will infiltrate 91% of the flows from the continuous model WWHM3, and release the remainder of the flows in an overflow pipe into the adjacent wetlands. The release rates will be at or below the allowable release rates, with the existing basin modeled as old growth forest, type C soils.

2.2 Proposed Construction Activities

Proposed site improvements include relocation of the existing above ground tank (currently inside the 25' natural Evans Creek buffer) to be outside the buffer. Then the pump in the above ground tank will be upsized to provide adequate pressure and flow to the proposed new bioinfiltration pond. This pond is proposed to be located on the North side of the creek in the eastern portions of the site. The pond is needed to provide enhanced treatment of the runoff from the site. The pond will infiltrate 91% of the flows from the continuous model WWHM3, and release the remainder of the flows in an overflow pipe into the adjacent wetlands. The release rates will be at or below the allowable release rates, with the existing basin modeled as old growth forest, type C soils.

The site is draining 1.94 acres, but only disturbing approximately 14,000 s.f., which is the areas next to the creek to be restored, and the bioinfiltration pond. But as the site is in the wellhead protection area, the 1.94 acres will be treated and infiltrated on the site. There is a small portion of the drainage that will be released in a release structure (8.1% of the total event). But, all 10 minimum requirements apply.

Construction activities will include site preparation, TESC installation, grading, excavation for the infiltration pond, removal of the impervious surfaces and retaining walls identified on the plans inside the 25' natural buffer.

A temporary sedimentation facility will be not be provided on the site, instead all water will be routed (pumped if necessary) into the site drainage system. It will then be routed to the existing wet vault and pumped into the sites existing infiltration system (injection well).

Thus no sediment control system will be designed or constructed on the site. It should be noted that the abandonment of the existing injection well and the change to the new bio infiltration pond for treatment and discharge will occur after the pond is stabilized.

The following summarizes details regarding site areas:

- Total site area (that drains into drainage system): 1.94 acres
- Percent impervious area before construction: 100 %
- Percent impervious area after construction: 100 %
- Disturbed area during construction: 0.32 acres
- Disturbed area that is characterized as impervious (i.e., access roads, staging, parking): 1.62 acres
- 2-year stormwater runoff peak flow prior to construction (existing): 0.074 cfs
- 10-year stormwater runoff peak flow prior to construction (existing): 0.127 cfs
- 2-year stormwater runoff peak flow during construction: 0.074 cfs
- 10-year stormwater runoff peak flow during construction: 0.127 cfs
- 2-year stormwater runoff peak flow after construction: 0.028 cfs

- 10-year stormwater runoff peak flow after construction: 0.066 cfs

3.0 Construction Stormwater BMPs

3.1 The 12 BMP Elements

3.1.1 Element #1 – Mark Clearing Limits

To protect adjacent properties and to reduce the area of soil exposed to construction, the limits of construction will be clearly marked before land-disturbing activities begin. Trees that are to be preserved, as well as all sensitive areas and their buffers, shall be clearly delineated, both in the field and on the plans. In general, natural vegetation and native topsoil shall be retained in an undisturbed state to the maximum extent possible. The BMPs relevant to marking the clearing limits that will be applied for this project include:

- High Visibility Plastic or Metal Fence (BMP C103)

Alternate BMPs for marking clearing limits are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

3.1.2 Element #2 – Establish Construction Access

Construction access or activities occurring on unpaved areas shall be minimized, yet where necessary, access points shall be stabilized to minimize the tracking of sediment onto public roads, and wheel washing, street sweeping, and street cleaning shall be employed to prevent sediment from entering state waters. All wash wastewater shall be controlled on site. The specific BMPs related to establishing construction access that will be used on this project include:

- Stabilized Construction Entrance (BMP C105)

Alternate construction access BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or

more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

3.1.3 Element #3 – Control Flow Rates

In order to protect the properties and waterways downstream of the project site, stormwater discharges from the site will be controlled. The specific BMPs for flow control that shall be used on this project include:

- The existing drainage system

A temporary sedimentation facility will be not be provided on the site, instead all water will be routed (pumped if necessary) into the site drainage system. It will then be routed to the existing wet vault and pumped into the sites existing infiltration system (injection well).

Thus no sediment control system will be designed or constructed on the site. It should be noted that the abandonment of the existing injection well and the change to the new bio infiltration pond for treatment and discharge will occur after the pond is stabilized.

Alternate flow control BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

The project site is located west of the Cascade Mountain Crest. As such, the project must comply with Minimum Requirement 7 (Ecology 2005).

In general, discharge rates of stormwater from the site will be controlled where increases in impervious area or soil compaction during construction could lead to downstream erosion, or where necessary to meet local agency stormwater discharge requirements (e.g. discharge to combined sewer systems).

3.1.4 Element #4 – Install Sediment Controls

All stormwater runoff from disturbed areas shall pass through an appropriate sediment removal BMP before leaving the construction site or prior to being discharged to an infiltration facility. The specific BMPs to be used for controlling sediment on this project include:

- Silt Fence (BMP C233)

- Storm Drain Inlet Protection (BMP C220)

- Materials on Hand (BMP C150) may also be applicable

Silt fence will be placed just inside of the clearing and grading limits around the entire site perimeter prior to any clearing or grading. Storm drain inlet projection will be provided at all catch basins immediately after installation. Erosion prevention and sediment control materials will be kept on the project site at all times, stockpiled and readily available. The proposed sediment ponds will be used as settling basins during construction.

Alternate sediment control BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

In addition, sediment will be removed from paved areas in and adjacent to construction work areas manually or using mechanical sweepers, as needed, to minimize tracking of sediments on vehicle tires away from the site and to minimize wash off of sediments from adjacent streets in runoff.

Whenever possible, sediment laden water shall be discharged into onsite, relatively level, vegetated areas (BMP C240 paragraph 5, page 4-102).

In some cases, sediment discharge in concentrated runoff can be controlled using permanent stormwater BMPs (e.g., infiltration swales, ponds, trenches). Sediment loads can limit the effectiveness of some permanent stormwater BMPs, such as those used for infiltration or biofiltration; however, those BMPs designed to remove solids by settling (wet ponds or detention ponds) can be used during the construction phase. When permanent stormwater BMPs will be used to control sediment discharge during construction, the structure will be protected from excessive sedimentation with adequate erosion and sediment control BMPs. Any accumulated sediment shall be removed after construction is complete and the permanent stormwater BMP will be restabilized with vegetation per applicable design requirements once the remainder of the site has been stabilized.

The following BMPs will be implemented as end-of-pipe sediment controls as required to meet permitted turbidity limits in the site discharge(s). Prior to the implementation of these technologies, sediment sources and erosion control and soil stabilization BMP efforts will be maximized to reduce the need for end-of-pipe sedimentation controls.

- Temporary Sediment Pond (BMP C241)
- Construction Stormwater Filtration (BMP C251)

- Construction Stormwater Chemical Treatment (BMP C 250) (implemented only with prior written approval from Ecology).

3.1.5 Element #5 – Stabilize Soils

Exposed and unworked soils shall be stabilized with the application of effective BMPs to prevent erosion throughout the life of the project. The specific BMPs for soil stabilization that shall be used on this project include:

- Temporary and Permanent Seeding (BMP C120)
- Plastic Covering (BMP C123)
- Dust Control (BMP C140)
- Early application of gravel base on areas to be paved

Seeding will be used on disturbed areas that have reached final grade or that will remain unworked for more than thirty days. Plastic Covering will be used on the temporary stock pile areas and elsewhere on the site as needed. Dust control will be implemented as needed, to prevent it being required all roadways and driveways to be paved will receive early application of gravel base.

Alternate soil stabilization BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

The project site is located west of the Cascade Mountain Crest. As such, no soils shall remain exposed and unworked for more than 7 days during the dry season (May 1 to September 30) and 2 days during the wet season (October 1 to April 30). Regardless of the time of year, all soils shall be stabilized at the end of the shift before a holiday or weekend if needed based on weather forecasts.

In general, cut and fill slopes will be stabilized as soon as possible and soil stockpiles will be temporarily covered with plastic sheeting. All stockpiled soils shall be stabilized from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways, and drainage channels.

3.1.6 Element #6 – Protect Slopes

All cut and fill slopes will be designed, constructed, and protected in a manner than minimizes erosion. The following specific BMPs will be used to protect slopes for this project:

- Temporary and Permanent Seeding (BMP C120)
- Interceptor Dike and Swale (BMP C200)
- Check Dams (BMP C207)
- Materials on Hand (BMP C150)

Alternate slope protection BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

3.1.7 Element #7 – Protect Drain Inlets

All storm drain inlets and culverts made operable during construction shall be protected to prevent unfiltered or untreated water from entering the drainage conveyance system. However, the first priority is to keep all access roads clean of sediment and keep street wash water separate from entering storm drains until treatment can be provided. Storm Drain Inlet Protection (BMP C220) will be implemented for all drainage inlets and culverts that could potentially be impacted by sediment-laden runoff on and near the project site. The following inlet protection measures will be applied on this project:

- Gravel and Wire Drop Inlet Protection
- Catch Basin Filters
- Alternative BMP not included in the SWMMWW (2005) or SWMMEW (2004)

If the BMP options listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D), or if no BMPs are listed above but deemed necessary during construction, the Certified Erosion and Sediment Control Lead shall implement one or more of the alternative BMP inlet protection options listed in Appendix C.

3.1.8 Element #8 – Stabilize Channels and Outlets

Where site runoff is to be conveyed in channels, or discharged to a stream or some other natural drainage point, efforts will be taken to prevent downstream erosion. The specific BMPs for channel and outlet stabilization that shall be used on this project include:

- Check Dams (BMP C207)

Alternate channel and outlet stabilization BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

The project site is located west of the Cascade Mountain Crest. As such, all temporary on-site conveyance channels shall be designed, constructed, and stabilized to prevent erosion from the expected peak 10 minute velocity of flow from a Type 1A, 10-year, 24-hour recurrence interval storm for the developed condition. Alternatively, the 10-year, 1-hour peak flow rate indicated by an approved continuous runoff simulation model, increased by a factor of 1.6, shall be used. Stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent streambanks, slopes, and downstream reaches shall be provided at the outlets of all conveyance systems.

3.1.9 Element #9 – Control Pollutants

All pollutants, including waste materials and demolition debris, that occur onsite shall be handled and disposed of in a manner that does not cause contamination of stormwater. Good housekeeping and preventative measures will be taken to ensure that the site will be kept clean, well organized, and free of debris. If required, BMPs to be implemented to control specific sources of pollutants are discussed below.

Vehicles, construction equipment, and/or petroleum product storage/dispensing:

- All vehicles, equipment, and petroleum product storage/dispensing areas will be inspected regularly to detect any leaks or spills, and to identify maintenance needs to prevent leaks or spills.
- On-site fueling tanks and petroleum product storage containers shall include secondary containment.
- Spill prevention measures, such as drip pans, will be used when conducting maintenance and repair of vehicles or equipment.

- In order to perform emergency repairs on site, temporary plastic will be placed beneath and, if raining, over the vehicle.

- Contaminated surfaces shall be cleaned immediately following any discharge or spill incident.

Concrete and grout:

- Process water and slurry resulting from concrete work will be prevented from entering the waters of the State by implementing Concrete Handling measures (BMP C151).

Solid Waste:

- Solid waste will be stored in secure, clearly marked containers.

The facility does not require a Spill Prevention, Control, and Countermeasure (SPCC) Plan under the Federal regulations of the Clean Water Act (CWA).

3.1.10 Element #10 – Control Dewatering

There will be no dewatering as part of this construction project.

All temporary and permanent erosion and sediment control BMPs shall be maintained and repaired as needed to assure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with each particular BMP's specifications. Visual monitoring of the BMPs will be conducted at least once every calendar week and within 24 hours of any rainfall event that causes a discharge from the site. If the site becomes inactive, and is temporarily stabilized, the inspection frequency will be reduced to once every month.

All temporary erosion and sediment control BMPs shall be removed within 30 days after the final site stabilization is achieved or after the temporary BMPs are no longer needed. Trapped sediment shall be removed or stabilized on site. Disturbed soil resulting from removal of BMPs or vegetation shall be permanently stabilized.

3.1.12 Element #12 – Manage the Project

Erosion and sediment control BMPs for this project have been designed based on the following principles:

- Design the project to fit the existing topography, soils, and drainage patterns.

- Emphasize erosion control rather than sediment control.
- Minimize the extent and duration of the area exposed.
- Keep runoff velocities low.
- Retain sediment on site.
- Thoroughly monitor site and maintain all ESC measures.
- Schedule major earthwork during the dry season.

As this project site is located west of the Cascade Mountain Crest, the project will be managed according to the following key project components:

Phasing of Construction

- The construction project is being phased to the extent practicable in order to prevent soil erosion, and, to the maximum extent possible, the transport of sediment from the site during construction.
- Revegetation of exposed areas and maintenance of that vegetation shall be an integral part of the clearing activities during each phase of construction, per the Scheduling BMP (C 162).

Seasonal Work Limitations

- From October 1 through April 30, clearing, grading, and other soil disturbing activities shall only be permitted if shown to the satisfaction of the local permitting authority that silt-laden runoff will be prevented from leaving the site through a combination of the following:
    - □ Site conditions including existing vegetative coverage, slope, soil type, and proximity to receiving waters; and
    - □ Limitations on activities and the extent of disturbed areas; and
    - □ Proposed erosion and sediment control measures.
- Based on the information provided and/or local weather conditions, the local permitting authority may expand or restrict the seasonal limitation on site disturbance.

- The following activities are exempt from the seasonal clearing and grading limitations:

  - Routine maintenance and necessary repair of erosion and sediment control BMPs;

  - Routine maintenance of public facilities or existing utility structures that do not expose the soil or result in the removal of the vegetative cover to soil; and

  - Activities where there is 100 percent infiltration of surface water runoff within the site in approved and installed erosion and sediment control facilities.

Coordination with Utilities and Other Jurisdictions

- Care has been taken to coordinate with utilities, other construction projects, and the local jurisdiction in preparing this SWPPP and scheduling the construction work.

Inspection and Monitoring

- All BMPs shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function. Site inspections shall be conducted by a person who is knowledgeable in the principles and practices of erosion and sediment control. This person has the necessary skills to:

  - Assess the site conditions and construction activities that could impact the quality of stormwater, and

  - Assess the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges.

- A Certified Erosion and Sediment Control Lead shall be on-site or on-call at all times.

- Whenever inspection and/or monitoring reveals that the BMPs identified in this SWPPP are inadequate, due to the actual discharge of or potential to discharge a significant amount of any pollutant, appropriate BMPs or design changes shall be implemented as soon as possible.

Maintaining an Updated Construction SWPPP

- This SWPPP shall be retained on-site or within reasonable access to the site.
- The SWPPP shall be modified whenever there is a change in the design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the state.
- The SWPPP shall be modified if, during inspections or investigations conducted by the owner/operator, or the applicable local or state regulatory authority, it is determined that the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. The SWPPP shall be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the SWPPP shall be completed within seven (7) days following the inspection.

3.2 Site Specific BMPs

Site specific BMPs are shown on the TESC Plan Sheets and Details in Appendix A. These site specific plan sheets will be updated annually.

3.3 Additional Advanced BMPs

4.0 Construction Phasing and BMP Implementation

The BMP implementation schedule will be driven by the construction schedule. The following provides a sequential list of the proposed construction schedule milestones and the corresponding BMP implementation schedule. The list contains key milestones such as wet season construction.

The BMP implementation schedule listed below is keyed to proposed phases of the construction project, and reflects differences in BMP installations and inspections that relate to wet season construction. The project site is located west of the Cascade Mountain Crest. As such, the dry season is considered to be from May 1 to September 30 and the wet season is considered to be from October 1 to April 30.

- Estimate of Construction Start Date — June 2013
- Estimate of Construction End Date — October 2013
- Mobilize equipment on site: — June 2012
- Mobilize and store all ESC and soil stabilization products: — June 2012
- Install ESC measures: — June 2012
- Install stabilized construction entrance: — N/A
- Begin clearing and grubbing: — June 2012

5.0 Pollution Prevention Team

5.1 Roles and Responsibilities

The pollution prevention team consists of personnel responsible for implementation of the SWPPP, including the following:

- Certified Erosion and Sediment Control Lead (CESCL) – primary contractor contact, responsible for site inspections (BMPs, visual monitoring, sampling, etc.); to be called upon in case of failure of any ESC measures.
- Resident Engineer – For projects with engineered structures only (sediment ponds/traps, sand filters, etc.): site representative for the owner that is the project's supervising engineer responsible for inspections and issuing instructions and drawings to the contractor's site supervisor or representative
- Emergency Ecology Contact – individual to be contacted at Ecology in case of emergency.
- Emergency Owner Contact – individual that is the site owner or representative of the site owner to be contacted in the case of an emergency.
- Non-Emergency Ecology Contact – individual that is the site owner or representative of the site owner than can be contacted if required.
- Monitoring Personnel – personnel responsible for conducting water quality monitoring; for most sites this person is also the Certified Erosion and Sediment Control Lead.

5.2 Team Members

Names and contact information for those identified as members of the pollution prevention team are provided in the following table.

Title	Name(s)	Phone Number
Certified Erosion and Sediment Control Lead (CESCL)	Bill Helsley	425-486-6533
Resident Engineer	Andrew Reaves	425-486-6533
Emergency Ecology Contact	Puget Sound Office	425-649-7000
Emergency Owner Contact	Andrew Reaves	425-486-6533
Non-Emergency Ecology Contact	Northwest Region	425-649-7000
Monitoring Personnel	Andrew Reaves	425-486-6533

6.0 Site Inspections and Monitoring

Monitoring includes visual inspection, monitoring for water quality parameters of concern, and documentation of the inspection and monitoring findings in a site log book. A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements;
- Site inspections; and,
- Stormwater quality monitoring.

For convenience, the inspection form and water quality monitoring forms included in this SWPPP include the required information for the site log book. This SWPPP may function as the site log book if desired, or the forms may be separated and included in a separate site log book. However, if separated, the site log book but must be maintained on-site or within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

6.1 Site Inspection

All BMPs will be inspected, maintained, and repaired as needed to assure continued performance of their intended function. The inspector will be a Certified Erosion and Sediment Control Lead (CESCL) per BMP C160. The name and contact information for the CESCL is provided in Section 5 of this SWPPP.

Site inspection will occur in all areas disturbed by construction activities and at all stormwater discharge points. Stormwater will be examined for the presence of suspended sediment, turbidity, discoloration, and oily sheen. The site inspector will evaluate and document the effectiveness of the installed BMPs and determine if it is necessary to repair or replace any of the BMPs to improve the quality of stormwater discharges. All maintenance and repairs will be documented in the site log book or forms provided in this document. All new BMPs or design changes will be documented in the SWPPP as soon as possible.

6.1.1 Site Inspection Frequency

Site inspections will be conducted at least once a week and within 24 hours following any rainfall event which causes a discharge of stormwater from the site. For sites with temporary stabilization measures, the site inspection frequency can be reduced to once every month.

6.1.2 Site Inspection Documentation

The site inspector will record each site inspection using the site log inspection forms provided in Appendix E. The site inspection log forms may be separated from this SWPPP document, but will be maintained on-site or within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

6.2 Stormwater Quality Monitoring

6.2.1 Turbidity Sampling

Monitoring requirements for the proposed project will include turbidity sampling to monitor site discharges for water quality compliance with the 2005 Construction Stormwater General Permit (Appendix D). Sampling will be conducted at all site discharge points at least once per calendar week.

Turbidity monitoring will follow the analytical methodologies described in Section S4 of the 2005 Construction Stormwater General Permit (Appendix D). The key benchmark values that require action include 25 NTU and 250 NTU for turbidity. If the 25 NTU benchmark for turbidity is exceeded, the following steps will be conducted:

1. Ensure all BMPs specified in this SWPPP are installed and functioning as intended.

2. Assess whether additional BMPs should be implemented and make revisions to the SWPPP as necessary.

3. Sample the discharge location daily until the analysis results are less than 25 NTU (turbidity) or 32 cm (transparency).

If the turbidity is greater than 25 NTU but less than 250 NTU for more than 3 days, additional treatment BMPs will be implemented within 24 hours of the third consecutive sample that exceeded the benchmark value. Additional treatment BMPs will include, but are not limited to, off-site treatment, infiltration, filtration and chemical treatment.

If the 250 NTU benchmark for turbidity is exceeded at any time, the following steps will be conducted:

1. Notify Ecology by phone within 24 hours of analysis.

2. Continue daily sampling until the turbidity is less than 25 NTU.

3. Initiate additional treatment BMPs such as off-site treatment, infiltration, filtration and chemical treatment within 24 hours of the first 250 NTU exceedance.

4. Implement additional treatment BMPs as soon as possible, but within 7 days of the first 250 NTU exceedance.

5. Describe inspection results and remedial actions that are taken in the site log book and in monthly discharge monitoring reports.

6.2.2 pH Sampling

Stormwater runoff will be monitored for pH starting on the first day of any activity that includes more than 40 yards of poured or recycled concrete, or after the application of "Engineered Soils" such as, Portland cement treated base, cement kiln dust, or fly ash. This does not include fertilizers. For concrete work, pH monitoring will start the first day concrete is poured and continue until 3 weeks after the last pour. For engineered soils, the pH monitoring period begins when engineered soils are first exposed to precipitation and continue until the area is fully stabilized.

Stormwater samples will be collected daily from all points of discharge from the site and measured for pH using a calibrated pH meter, pH test kit, or wide range pH indicator paper. If the measured pH is 8.5 or greater, the following steps will be conducted:

1. Prevent the high pH water from entering storm drains or surface water.

2. Adjust or neutralize the high pH water if necessary using appropriate technology such as CO_2 sparging (liquid or dry ice).

3. Contact Ecology if chemical treatment other than CO_2 sparging is planned.

7.0 Reporting and Recordkeeping

7.1 Recordkeeping

7.1.1 Site Log Book

A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements;
- Site inspections; and,
- Stormwater quality monitoring.

For convenience, the inspection form and water quality monitoring forms included in this SWPPP include the required information for the site log book.

7.1.2 Records Retention

Records of all monitoring information (site log book, inspection reports/checklists, etc.), this Stormwater Pollution Prevention Plan, and any other documentation of compliance with permit requirements will be retained during the life of the construction project and for a minimum of three years following the termination of permit coverage in accordance with permit condition S5.C.

7.1.3 Access to Plans and Records

The SWPPP, General Permit, Notice of Authorization letter, and Site Log Book will be retained on site or within reasonable access to the site and will be made immediately available upon request to Ecology or the local jurisdiction. A copy of this SWPPP will be provided to Ecology within 14 days of receipt of a written request for the SWPPP from Ecology. Any other information requested by Ecology will be submitted within a reasonable time. A copy of the SWPPP or access to the SWPPP will be provided to the public when requested in writing in accordance with permit condition S5.G.

7.1.4 Updating the SWPPP

In accordance with Conditions S3, S4.B, and S9.B.3 of the General Permit, this SWPPP will be modified if the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site or there has been a change in design, construction, operation, or maintenance at the site that has a significant effect on the discharge, or potential for discharge, of pollutants to the waters of the State. The SWPPP will be modified within seven days of determination based on inspection(s) that additional or modified BMPs are necessary to correct problems identified, and an updated timeline for BMP implementation will be prepared.

7.2 Reporting

7.2.1 Discharge Monitoring Reports

Discharge Monitoring Report (DMR) forms will not be submitted to Ecology because water quality sampling is not being conducted at the site.

7.2.2 Notification of Noncompliance

If any of the terms and conditions of the permit are not met, and it causes a threat to human health or the environment, the following steps will be taken in accordance with permit section S5.F:

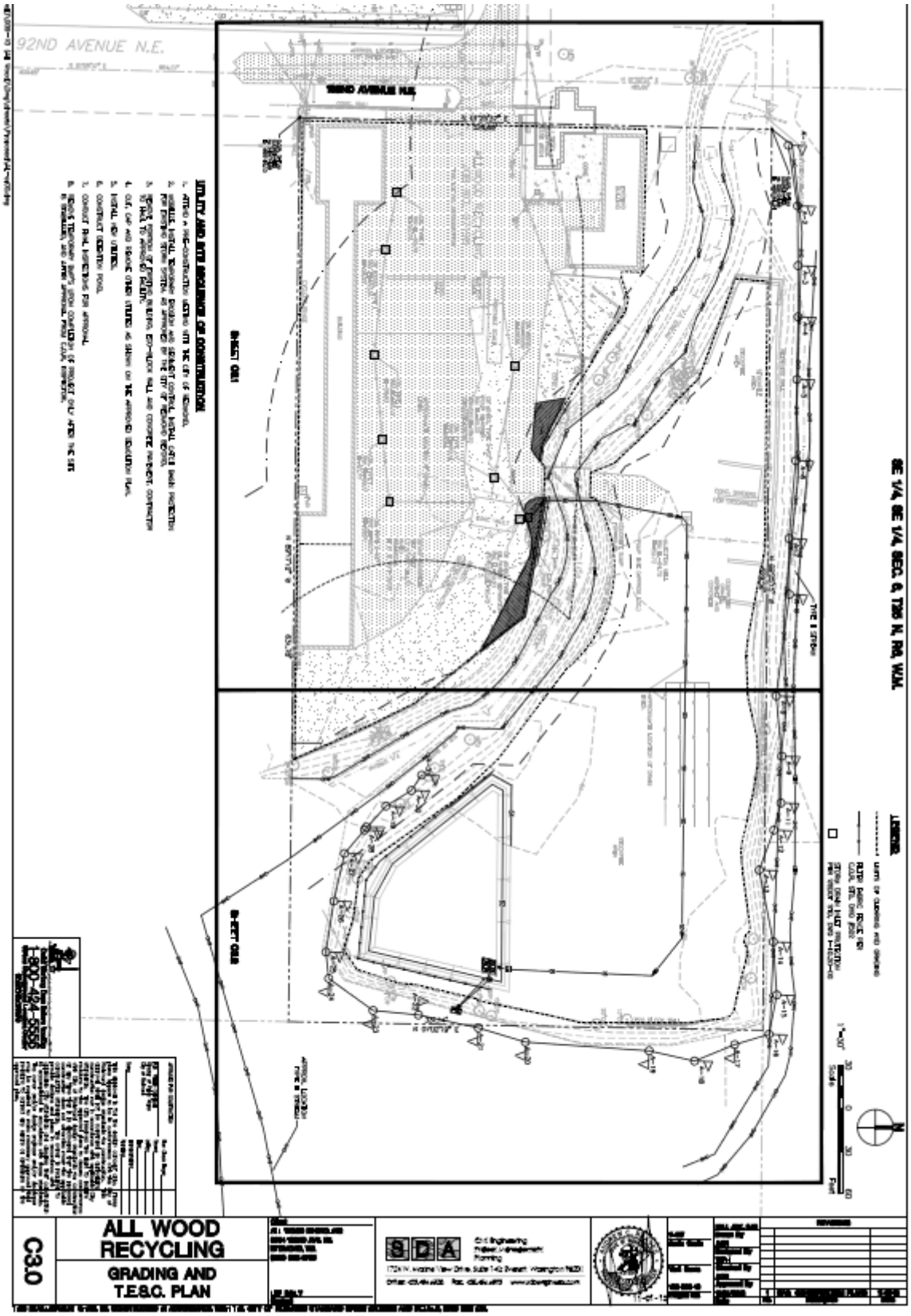
1. Ecology will be immediately notified of the failure to comply.

2. Immediate action will be taken to control the noncompliance issue and to correct the problem. If applicable, sampling and analysis of any noncompliance will be repeated immediately and the results submitted to Ecology within five (5) days of becoming aware of the violation.

3. A detailed written report describing the noncompliance will be submitted to Ecology within five (5) days, unless requested earlier by Ecology.

In accordance with permit condition S2.A, a complete application form will be submitted to Ecology and the appropriate local jurisdiction (if applicable) to be covered by the General Permit.

Appendix A – Site Plans


92ND AVENUE N.E.
THIRD AVENUE N.E.
SHEET C3.1
SHEET C3.2
SE 1/4, SE 1/4, SEC. 6, T30 N, R4, W.M.
LEGEND
Scale
Feet
C3.0
ALL WOOD RECYCLING
GRADING AND T.E.S.C. PLAN
SDA

Appendix B – Construction BMPs

High Visibility Plastic or Metal Fence (BMP C103)

Silt Fence (BMP C233)

Storm Drain Inlet Protection (BMP C220)

Materials on Hand (BMP C150) may also be applicable

Detention Pond Or Vault

Temporary and Permanent Seeding (BMP C120)

Plastic Covering (BMP C123)

Topsoiling (BMP C125)

Dust Control (BMP C140)

Early application of gravel base on areas to be paved

Temporary and Permanent Seeding (BMP C120)

Interceptor Dike and Swale (BMP C200)

Check Dams (BMP C207)

Materials on Hand (BMP C150)

Grass-Lined Channels (BMP C201)

Check Dams (BMP C207)

Appendix C – Alternative BMPs

The following includes a list of possible alternative BMPs for each of the 12 elements not described in the main SWPPP text. This list can be referenced in the event a BMP for a specific element is not functioning as designed and an alternative BMP needs to be implemented.

Element #1 - Mark Clearing Limits

High Visibility Plastic or Metal Fence (BMP C103)

Element #2 - Establish Construction Access

Wheel Wash (BMP C106)

Element #3 - Control Flow Rates

Alternative BMP not included in the SWMMWW (2005)

Element #4 - Install Sediment Controls

Straw Bale Barrier (BMP C230)

Vegetated Strip (BMP C234)

Materials on Hand (BMP C150)

Advanced BMPs:

Element #5 - Stabilize Soils

Dust Control (BMP C140)

Topsoiling (BMP C125)

Sodding (BMP C124)

Element #6 - Protect Slopes

Straw Wattles (BMP C235)

Grass-Lined Channels (BMP C201)

Element #8 - Stabilize Channels and Outlets

Level Spreader (BMP C206)

Element #10 - Control Dewatering

There will be no dewatering as part of this project.

Appendix D – General Permit

Appendix E – Site Inspection Forms (and Site Log)

The results of each inspection shall be summarized in an inspection report or checklist that is entered into or attached to the site log book. It is suggested that the inspection report or checklist be included in this appendix to keep monitoring and inspection information in one document, but this is optional. However, it is mandatory that this SWPPP and the site inspection forms be kept onsite at all times during construction, and that inspections be performed and documented as outlined below.

At a minimum, each inspection report or checklist shall include:

a. Inspection date/times

b. Weather information: general conditions during inspection, approximate amount of precipitation since the last inspection, and approximate amount of precipitation within the last 24 hours.

c. A summary or list of all BMPs that have been implemented, including observations of all erosion/sediment control structures or practices.

d. The following shall be noted:

i. locations of BMPs inspected,

ii. locations of BMPs that need maintenance,

iii. the reason maintenance is needed,

iv. locations of BMPs that failed to operate as designed or intended, and

v. locations where additional or different BMPs are needed, and the reason(s) why

e. A description of stormwater discharged from the site. The presence of suspended sediment, turbid water, discoloration, and/or oil sheen shall be noted, as applicable.

f. A description of any water quality monitoring performed during inspection, and the results of that monitoring.

g. General comments and notes, including a brief description of any BMP r repairs, maintenance or installations made as a result of the inspection.

h. A statement that, in the judgment of the person conducting the site inspection, the site is either in compliance or out of compliance with the terms and conditions of the SWPPP and the NPDES permit. If the site inspection indicates that the site is out of compliance, the inspection report shall include a summary of the remedial actions required to bring the site back into compliance, as well as a schedule of implementation.

i. Name, title, and signature of person conducting the site inspection; and the following statement: “I certify under penalty of law that this report is true, accurate, and complete, to the best of my knowledge and belief”.

When the site inspection indicates that the site is not in compliance with any terms and conditions of the NPDES permit, the Permittee shall take immediate action(s) to: stop, contain, and clean up the unauthorized discharges, or otherwise stop the noncompliance; correct the problem(s); implement appropriate Best Management Practices (BMPs), and/or conduct maintenance of existing BMPs; and achieve compliance with all applicable standards and permit conditions. In addition, if the noncompliance causes a threat to human health or the environment, the Permittee shall comply with the Noncompliance Notification requirements in Special Condition S5.F of the permit.

Site Inspection Form

General Information			
Project Name:			
Inspector Name:		**Title:** **CESCL #:**	
Date:		**Time:**	
Inspection Type:	□ After a rain event □ Weekly □ Turbidity/transparency benchmark exceedance □ Other		
Weather			
Precipitation	Since last inspection	In last 24 hours	
Description of General Site Conditions:			

Inspection of BMPs							
Element 1: Mark Clearing Limits							
BMP:							
Location	Inspected			Functioning			Problem/Corrective Action
		Y	N		Y	N	NIP
BMP:							
Location	Inspected			Functioning			Problem/Corrective Action
		Y	N		Y	N	NIP
Element 2: Establish Construction Access							
BMP:							
Location	Inspected			Functioning			Problem/Corrective Action
		Y	N		Y	N	NIP

BMP:							
Location	Inspected			Functioning			Problem/Corrective Action
		Y	N		Y	N	NIP

Element 3: Control Flow Rates							
BMP:							
Location	Inspected			Functioning			Problem/Corrective Action
		Y	N		Y	N	NIP
BMP:							
Location	Inspected			Functioning			Problem/Corrective Action
		Y	N		Y	N	NIP

Element 4: Install Sediment Controls							
BMP:							
Location	Inspected			Functioning			Problem/Corrective Action
		Y	N		Y	N	NIP
BMP:							
Location	Inspected			Functioning			Problem/Corrective Action
		Y	N		Y	N	NIP
BMP:							
Location	Inspected			Functioning			Problem/Corrective Action
		Y	N		Y	N	NIP

BMP:							
Location	Inspected			Functioning			Problem/Corrective Action
		Y	N		Y	N	NIP

BMP:							
Location	Inspected			Functioning			Problem/Corrective Action
		Y	N		Y	N	NIP

Element 5: Stabilize Soils						
BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

Element 6: Protect Slopes						
BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

Element 7: Protect Drain Inlets

BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

Element 8: Stabilize Channels and Outlets

BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:								
Location	Inspected			Functioning			Problem/Corrective Action	
		Y	N		Y	N	NIP	

BMP:								
Location	Inspected			Functioning			Problem/Corrective Action	
		Y	N		Y	N	NIP	

Element 9: Control Pollutants

BMP:								
Location	Inspected			Functioning			Problem/Corrective Action	
		Y	N		Y	N	NIP	

BMP:								
Location	Inspected			Functioning			Problem/Corrective Action	
		Y	N		Y	N	NIP	

Element 10: Control Dewatering

BMP:								
Location	Inspected			Functioning			Problem/Corrective Action	
		Y	N		Y	N	NIP	

BMP:								
Location	Inspected			Functioning			Problem/Corrective Action	
		Y	N		Y	N	NIP	

BMP:								
Location	Inspected			Functioning			Problem/Corrective Action	
		Y	N		Y	N	NIP	

Stormwater Discharges From the Site				
	Observed?			Problem/Corrective Action
		Y	N	
Location				
Turbidity				
Discoloration				
Sheen				
Location				
Turbidity				
Discoloration				
Sheen				

Water Quality Monitoring		
Was any water quality monitoring conducted?	□ Yes	□ No
If water quality monitoring was conducted, record results here:		
If water quality monitoring indicated turbidity 250 NTU or greater; or transparency 6 cm or less, was Ecology notified by phone within 24 hrs?	□ Yes	□ No
If Ecology was notified, indicate the date, time, contact name and phone number below:		
Date:		
Time:		
Contact Name:		
Phone #:		
General Comments and Notes		
Include BMP repairs, maintenance, or installations made as a result of the inspection.		
Were Photos Taken?	□ Yes	□ No
If photos taken, describe photos below:		

Appendix F – Engineering Calculations

SECTION 8.6
TESC CALCULATIONS

Basin A – This basin is located on the northwestern portion of the site and will contain 1.37 acres. Flow will travel in a westerly direction in a proposed interceptor swale and discharge into proposed sediment trap "A", which will discharge treated stormwater into the adjacent on site wetland.

Basin A Steps

1. Obtain the sediment trap volume (2 year/24 hour developed storm).

   $Vol_{2yr/\ 24hr}$ = 0.07 Ac-ft = 3,050 cf (see attached tables)

2. Determine the Average Surface Area (SA) required to provide 3,050 cf of storage

   The detention vault will be used for desiment storage,

   Vault SA = 20' X 64, storage depth is 6.25' as the orifice will be blocked

   Thus volume is 20 x 64 x 6.25 = 8,000 s.f.

Thus, the detention vault would provide adequate temporary storage with the bottom orifice blocked.

Basin B – This basin is located on the southern portion of the site and will contain approximately 5.35 acres. Flow will travel to the west and discharge into proposed sediment pond "D", which will discharge treated stormwater into the adjacent on site wetland.

Basin D Steps

1. Obtain the sediment trap volume (10 year/24 hour developed storm).

   $Vol_{10yr/\ 24hr}$ = 0.45 Ac-ft = 19,600 cf (see attached tables)

2. Determine the Average Surface Area (SA) required to provide 19,600 cf of storage

   (Assuming 8' depth, which is the depth of the permanent pond)

   SA = 2,450 SF = 55' X 44', Permanent pond dimensions are 79' X 68'

   3' of sediment storage is required, 4' of sediment storage is provided.

The pond with top dimensions of 79' x 68' will provide adequate temporary storage.

Basin C – This basin is located on the southern portion of the site and will contain approximately 5.42 acres. Flow will travel to the west and discharge into proposed sediment pond "D", which will discharge treated stormwater into the adjacent on site wetland.

Basin D Steps

1. Obtain the sediment trap volume (10 year/24 hour developed storm).

   $Vol_{10yr/\ 24hr}$ = 0.45 Ac-ft = 19,600 cf (see attached tables)

2. Determine the Average Surface Area (SA) required to provide 19,600 cf of storage

   (Assuming 8' depth, which is the depth of the permanent pond)

   SA = 2,450 SF = 55' X 44', Permanent pond dimensions are 79' X 68'

   3' of sediment storage is required, 4' of sediment storage is provided.

The pond with top dimensions of 79' x 68' will provide adequate temporary storage.

SECTION 4

MINIMUM REQUIREMENT #3

SOURCE CONTROL OF POLLUTION

SOURCE CONTROL

The project proposes a number of source control BMPs, due to the current site use. These source control recommendations are provided in Appendix 4-A.

A spill control plan has also been prepared for the project, which is provided in Appendix 4-B.

APPENDIX 4-A

SOURCE CONTROL BMPS

BMPs for Dust Control at Disturbed Land Areas and Unpaved Roadways and Parking Lots

Description of Pollutant Sources: Dust can cause air and water pollution problems particularly at demolition sites and in arid areas where reduced rainfall exposes soil particles to transport by air.

Pollutant Control Approach: Minimize dust generation and apply environmentally friendly and government approved dust suppressant chemicals, if necessary.

Applicable Operational BMPs:

- Sprinkle or wet down soil or dust with water as long as it does not result in a wastewater discharge.
- Use only local and/or state government approved dust suppressant chemicals such as those listed in Ecology Publication #96-433, "Techniques for Dust Prevention and Suppression."
- Avoid excessive and repeated applications of dust suppressant chemicals. Time the application of dust suppressants to avoid or minimize their wash-off by rainfall or human activity such as irrigation.
- Apply stormwater containment to prevent the conveyance of stormwater TSS into storm drains or receiving waters.
- The use of motor oil for dust control is prohibited. Care should be taken when using lignin derivatives and other high BOD chemicals in excavations or areas easily accessible to surface water or ground water.
- Consult with the Ecology Regional Office in your area on discharge permit requirements if the dust suppression process results in a wastewater discharge to the ground, ground water, storm drain, or surface water.

Recommended Additional Operational BMPs for Roadways and Other Trafficked Areas:

- Consider limiting use of off-road recreational vehicles on dust generating land.
- Consider paving unpaved permanent roads and other trafficked areas at municipal, commercial, and industrial areas.
- Consider paving or stabilizing shoulders of paved roads with gravel, vegetation, or local government approved chemicals.
- Encourage use of alternate paved routes, if available.
- Vacuum or wet sweep fine dirt and skid control materials from paved roads soon after winter weather ends or when needed.
- Consider using traction sand that is pre-washed to reduce dust emissions.

Additional Recommended Operational BMPs for Dust Generating Areas:

- Prepare a dust control plan. Helpful references include: Control of Open Fugitive Dust Sources (EPA-450/3-88-088), and Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures (EPA-450/2-92-004)
- Limit exposure of soil (dust source) as much as feasible.
- Stabilize dust-generating soil by growing and maintaining vegetation, mulching, topsoiling, and/or applying stone, sand, or gravel.
- Apply windbreaks in the soil such as trees, board fences, tarp curtains, bales of hay, etc.
- Cover dust-generating piles with wind-impervious fabric, or equivalent material.

BMPs for Fueling At Dedicated Stations

Description of Pollutant Sources: A fueling station is a facility dedicated to the transfer of fuels from a stationary pumping station to mobile vehicles or equipment. It includes above or under-ground fuel storage facilities. In addition to general service gas stations, fueling may also occur at 24-hour convenience stores, construction sites, warehouses, car washes, manufacturing establishments, port facilities, and businesses with fleet vehicles. Typically, stormwater contamination at fueling stations is caused by leaks/spills of fuels, lube oils, radiator coolants, and vehicle washwater.

Pollutant Control Approach: New or substantially remodeled* fueling stations must be constructed on an impervious concrete pad under a roof to keep out rainfall and stormwater run-on. A treatment BMP must be used for contaminated stormwater and wastewaters in the fueling containment area.

* *Substantial remodeling includes replacing the canopy, or relocating or adding one or more fuel dispensers in such a way that the Portland cement concrete (or equivalent) paving in the fueling area is modified.*

For new or substantially remodeled Fueling Stations:

Applicable Operational BMPs:

- Prepare an emergency spill response and cleanup plan (per BMPs for Spills of Oil and Hazardous Substances) and have designated trained person(s) available either on site or on call at all times to promptly and properly implement that plan and immediately cleanup all spills. Keep suitable cleanup materials, such as dry adsorbent materials, on site to allow prompt cleanup of a spill.
- Train employees on the proper use of fuel dispensers. Post signs in accordance with the Uniform Fire Code (UFC). Post "No Topping Off" signs (topping off gas tanks causes spillage and vents gas fumes to the air). Make sure that the automatic shutoff on the fuel nozzle is functioning properly.
- The person conducting the fuel transfer must be present at the fueling pump during fuel transfer, particularly at unattended or self-serve stations.
- Keep drained oil filters in a suitable container or drum.

Applicable Structural Source Control BMPs:

- Design the fueling island to control spills (dead-end sump or spill control separator in compliance with the UFC), and to treat collected stormwater and/or wastewater to required levels. Slope the concrete containment pad around the fueling island toward drains; either trench drains, catch basins and/or a dead-end sump. The slope of the drains shall not be less than 1 percent (Section 7901.8 of the UFC). Drains to

treatment shall have a shutoff valve, which must be closed in the event of a spill. The spill control sump must be sized in compliance with Section 7901.8 of the UFC; or

- Design the fueling island as a spill containment pad with a sill or berm raised to a minimum of four inches (Section 7901.8 of the UFC) to prevent the runoff of spilled liquids and to prevent run-on of stormwater from the surrounding area. Raised sills are not required at the open-grate trenches that connect to an approved drainage-control system.
- The fueling pad must be paved with Portland cement concrete, or equivalent. Asphalt is not considered an equivalent material.
- The fueling island must have a roof or canopy to prevent the direct entry of precipitation onto the spill containment pad (see Figure 2.1). The roof or canopy should, at a minimum, cover the spill containment pad (within the grade break or fuel dispensing area) and preferably extend several additional feet to reduce the introduction of windblown rain. Convey all roof drains to storm drains outside the fueling containment area.

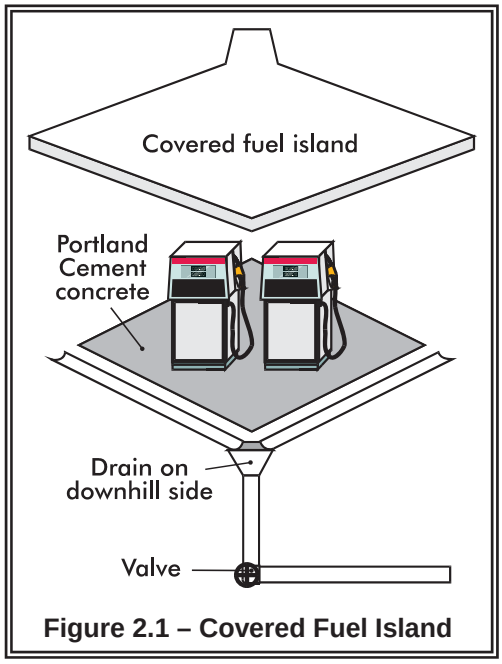


Figure 2.1 – Covered Fuel Island

- Stormwater collected on the fuel island containment pad must be conveyed to a sanitary sewer system, if approved by the sanitary authority; or to an approved treatment system such as an oil/water separator and a basic treatment BMP. (Basic treatment BMPs are listed in Volume V and include media filters and biofilters) Discharges from treatment systems to storm drains or surface water or to the ground must not display ongoing or recurring visible sheen and must not contain greater than a significant amount of oil and grease.

- Alternatively, stormwater collected on the fuel island containment pad may be collected and held for proper off site disposal.
- Conveyance of any fuel-contaminated stormwater to a sanitary sewer must be approved by the local sewer authority and must comply with pretreatment regulations (WAC 173-216-060). These regulations prohibit discharges that could "cause fire or explosion. An explosive or flammable mixture is defined under state and federal pretreatment regulations, based on a flash point determination of the mixture. If contaminated stormwater is determined not to be explosive, then it could be conveyed to a sanitary sewer system.
- Transfer the fuel from the delivery tank trucks to the fuel storage tank in impervious contained areas and ensure that appropriate overflow protection is used. Alternatively, cover nearby storm drains during the filling process and use drip pans under all hose connections.

Additional BMP for Vehicles 10 feet in height or greater

A roof or canopy may not be practicable at fueling stations that regularly fuel vehicles that are 10 feet in height or greater, particularly at industrial or WSDOT sites. At those types of fueling facilities, the following BMPs apply, as well as the applicable BMPs and fire prevention (UFC requirements) of this BMP for fueling stations:

- If a roof or canopy is impractical the concrete fueling pad must be equipped with emergency spill control, which includes a shutoff valve for the drainage from the fueling area. The valve must be closed in the event of a spill. An electronically actuated valve is preferred to minimize the time lapse between spill and containment. Spills must be cleaned up and disposed off-site in accordance with BMPs for Spills of Oil and Hazardous Substances.
- The valve may be opened to convey contaminated stormwater to a sanitary sewer, if approved by the sewer authority, or to oil removal treatment such as an API or CP oil/water separator, catchbasin insert, or equivalent treatment, and then to a basic treatment BMP. Discharges from treatment systems to storm drains or surface water or to the ground must not display ongoing or recurring visible sheen and must not contain greater than a significant amount of oil and grease.

An explosive or flammable mixture is defined under state and federal pretreatment regulations, based on a flash point determination of the mixture. If contaminated stormwater is determined not to be explosive or) then it could be conveyed to a sanitary sewer system.

BMPs for Loading and Unloading Areas for Liquid or Solid Material

Description of Pollutant Sources: Loading/unloading of liquid and solid materials at industrial and commercial facilities are typically conducted at shipping and receiving, outside storage, fueling areas, etc. Materials transferred can include products, raw materials, intermediate products, waste materials, fuels, scrap metals, etc. Leaks and spills of fuels, oils, powders, organics, heavy metals, salts, acids, alkalis, etc. during transfer are potential causes of stormwater contamination. Spills from hydraulic line breaks are a common problem at loading docks.

Pollutant Control Approach: Cover and contain the loading/ unloading area where necessary to prevent run-on of stormwater and runoff of contaminated stormwater.

Applicable Operational BMPs:

At All Loading/ Unloading Areas:

- *A* significant amount of debris can accumulate at outside, uncovered loading/unloading areas. Sweep these surfaces frequently to remove material that could otherwise be washed off by stormwater. Sweep outside areas that are covered for a period of time by containers, logs, or other material after the areas are cleared.
- Place drip pans, or other appropriate temporary containment device, at locations where leaks or spills may occur such as hose connections, hose reels and filler nozzles. Drip pans shall always be used when making and breaking connections (see Figure 2.2). Check loading/ unloading equipment such as valves, pumps, flanges, and connections regularly for leaks and repair as needed.

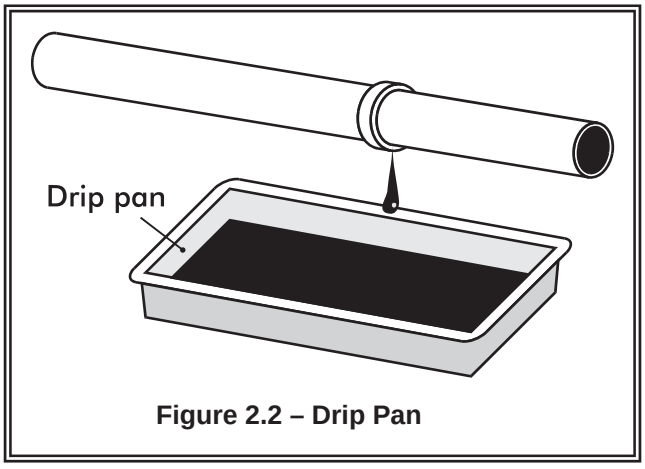


Figure 2.2 – Drip Pan

At Tanker Truck and Rail Transfer Areas to Above/Below-ground Storage Tanks:

- To minimize the risk of accidental spillage, prepare an "Operations Plan" that describes procedures for loading/unloading. Train the employees, especially fork lift operators, in its execution and post it or otherwise have it readily available to employees.
- Report spills of reportable quantities to Ecology (refer to Section 2.1 for telephone numbers of Ecology Regional Offices).
- Prepare and implement an Emergency Spill Cleanup Plan for the facility (BMP Spills of Oil and Hazardous Substances) which includes the following BMPs:
  - Ensure the clean up of liquid/solid spills in the loading/ unloading area immediately, if a significant spill occurs, and, upon completion of the loading/unloading activity, or, at the end of the working day.
  - Retain and maintain an appropriate oil spill cleanup kit on-site for rapid cleanup of material spills. (See BMP Spills of Oil and Hazardous Substances).
  - Ensure that an employee trained in spill containment and cleanup is present during loading/unloading.

At Rail Transfer Areas to Above/below-ground Storage Tanks: *Install* a drip pan system as illustrated (see Figure 2.3) within the rails to collect spills/leaks from tank cars and hose connections, hose reels, and filler nozzles.

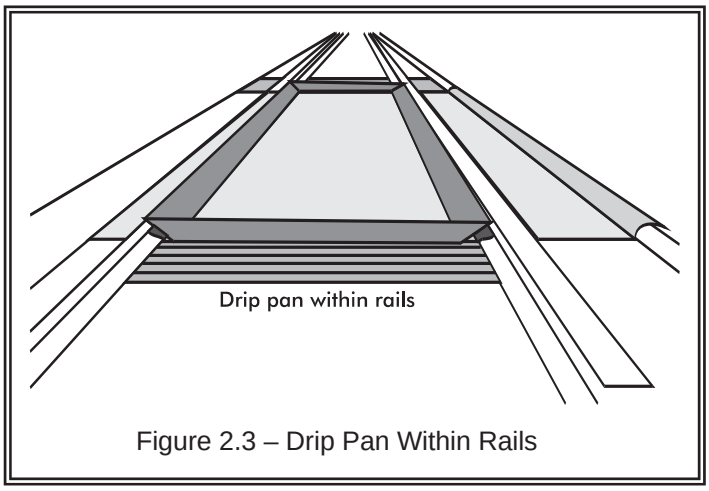


Figure 2.3 – Drip Pan Within Rails

Loading/Unloading from/to Marine Vessels: Facilities and procedures for the loading or unloading of petroleum products must comply with Coast Guard requirements specified in Appendix IV-D R.5.

Transfer of Small Quantities from Tanks and Containers: Refer to BMPs Storage of Liquids in Permanent Above-Ground Tanks, and Storage of Liquid, Food Waste, or Dangerous Waste Containers, for requirements on the transfer of small quantities from tanks and containers, respectively.

Applicable Structural Source Control BMPs:

At All Loading/ Unloading Areas:

- Consistent with Uniform Fire Code requirements (Appendix IV-D R.2) and to the extent practicable, conduct unloading or loading of solids and liquids in a manufacturing building, under a roof, or lean-to, or other appropriate cover.
- Berm, dike, and/or slope the loading/unloading area to prevent run-on of stormwater and to prevent the runoff or loss of any spilled material from the area.
- Large loading areas frequently are not curbed along the shoreline. As a result, stormwater passes directly off the paved surface into surface water. Place curbs along the edge, or slope the edge such that the stormwater can flow to an internal storm drain system that leads to an approved treatment BMP.
- Pave and slope loading/unloading areas to prevent the pooling of water. The use of catch basins and drain lines within the interior of the paved area must be minimized as they will frequently be covered by material, or they should be placed in designated "alleyways" that are not covered by material, containers or equipment.

Recommended Structural Source Control BMP: For the transfer of pollutant liquids in areas that cannot contain a catastrophic spill, install an automatic shutoff system in case of unanticipated off-loading interruption (e.g. coupling break, hose rupture, overfill, etc.).

At Loading and Unloading Docks:

- Install/maintain overhangs, or door skirts that enclose the trailer end (see Figures 2.4 and 2.5) to prevent contact with rainwater.
- Design the loading/unloading area with berms, sloping, etc. to prevent the run-on of stormwater.
- Retain on-site the necessary materials for rapid cleanup of spills.

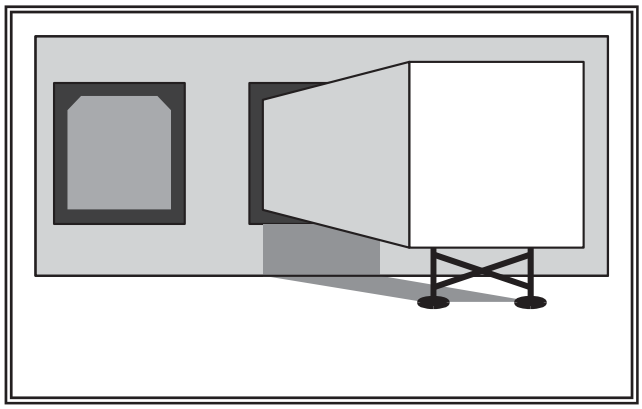


Figure 2.4 – Loading Dock with Door Skirt

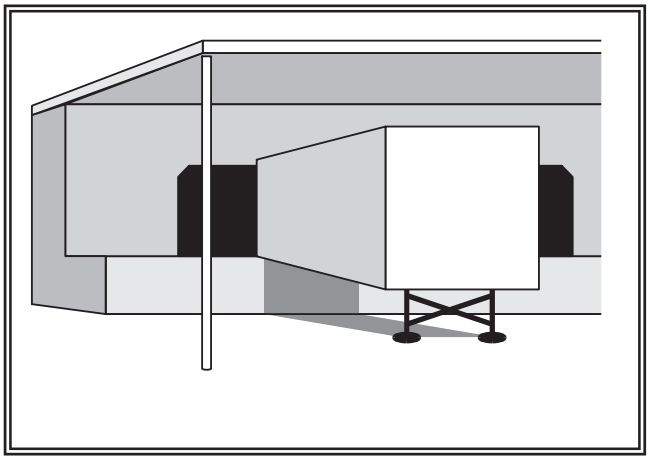


Figure 2.5 – Loading Dock with Overhang

At Tanker Truck Transfer Areas to Above/Below-Ground Storage Tanks:

- Pave the area on which the transfer takes place. If any transferred liquid, such as gasoline, is reactive with asphalt pave the area with Portland cement concrete.
- Slope, berm, or dike the transfer area to a dead-end sump, spill containment sump, a spill control (SC) oil/water separator, or other spill control device. The minimum spill retention time should be 15 minutes at the greater flow rate of the highest fuel dispenser nozzle through-put rate, or the peak flow rate of the 6-month, 24-hour storm event over the surface of the containment pad, whichever is greater. The volume of the spill containment sump should be a minimum of 50 gallons with an adequate grit sedimentation volume.

BMPs for Log Sorting and Handling

Description of Pollutant Sources: Log yards are paved or unpaved areas where logs are transferred, sorted, debarked, cut, and stored to prepare them for shipment or for the production of dimensional lumber, plywood, chips, poles, or other products. Log yards are generally maintained at sawmills, shipping ports, and pulp mills. Typical pollutants include oil and grease, BOD, settleable solids, total suspended solids (including soil), high and low pH, heavy metals, pesticides, wood-based debris, and leachate.

The following are pollutant sources:

- Log storage, rollout, sorting, scaling, and cutting areas
- Log and liquid loading areas
- Log sprinkling
- Debarking, bark bin and conveyor areas
- Bark, ash, sawdust and wood debris piles, and other solid wastes
- Metal salvage areas
- Truck, rail, ship, stacker, and loader access areas
- Log trucks, stackers, loaders, forklifts, and other heavy equipment
- Maintenance shops and parking areas
- Cleaning areas for vehicles, parts, and equipment
- Storage and handling areas for hydraulic oils, lubricants, fuels, paints, liquid wastes, and other liquid materials
- Pesticide usage for log preservation and surface protection
- Application of herbicides for weed control
- Contaminated soil resulting from leaks or spills of fluids

Ecology's Baseline General Permit Requirements:

Industries with log yards are required to obtain coverage under the baseline general permit for discharges of stormwater associated with industrial activities to surface water. The permit requires preparation and on-site retention of Stormwater Pollution Prevention Plans (SWPPP). The SWPPP must identify operational, source control, erosion and sediment control and, if necessary, treatment BMPs. Required and recommended operational, source control, and treatment BMPs are presented in detail in Ecology's Guidance Document: "Industrial Stormwater General Permit Implementation Manual for Log Yards, Publication # 04-10-031. It is recommended that all log yard facilities obtain a copy of this document.

BMPs for Maintenance and Repair of Vehicles and Equipment

Description of Pollutant Sources: Pollutant sources include parts/vehicle cleaning, spills/leaks of fuel and other liquids, replacement of liquids, outdoor storage of batteries/liquids/parts, and vehicle parking.

Pollutant Control Approach: Control of leaks and spills of fluids using good housekeeping and cover and containment BMPs.

Applicable Operational BMPs:

- Inspect for leaks all incoming vehicles, parts, and equipment stored temporarily outside.
- Use drip pans or containers under parts or vehicles that drip or that are likely to drip liquids, such as during dismantling of liquid containing parts or removal or transfer of liquids.
- Remove batteries and liquids from vehicles and equipment in designated areas designed to prevent stormwater contamination. Store cracked batteries in a covered non-leaking secondary containment system.
- Empty oil and fuel filters before disposal. Provide for proper disposal of waste oil and fuel.
- Do not pour/convey washwater, liquid waste, or other pollutant into storm drains or to surface water. Check with the local sanitary sewer authority for approval to convey to a sanitary sewer.
- Do not connect maintenance and repair shop floor drains to storm drains or to surface water. To allow for snowmelt during the winter a drainage trench with a sump for particulate collection can be installed and used only for draining the snowmelt and not for discharging any vehicular or shop pollutants.

Applicable Structural Source Control BMPs:

- Conduct all maintenance and repair of vehicles and equipment in a building, or other covered impervious containment area that is sloped to prevent run-on of uncontaminated stormwater and runoff of contaminated stormwater.
- The maintenance of refrigeration engines in refrigerated trailers may be conducted in the parking area with due caution to avoid the release of engine or refrigeration fluids to storm drains or surface water.
- Park large mobile equipment, such as log stackers, in a designated contained area.

For additional applicable BMPs refer to the following BMPs: Fueling at Dedicated Stations; Washing and Steam Cleaning Vehicle/Equipment/Building Structures; Loading and Unloading Areas for Liquid or Solid Material; Storage of Liquids in Permanent Above-Ground Tanks; Storage of Liquid, Food Waste, or Dangerous Waste Containers;

Storage or Transfer (Outside) of Solid Raw Materials, By-Products, or Finished Products; Spills of Oil and Hazardous Substances; Illicit Connections to Storm Drains; and other BMPs provided in this chapter.

Note that a treatment BMP is applicable for contaminated stormwater.

Applicable Treatment BMPs: Contaminated stormwater runoff from vehicle staging and maintenance areas must be conveyed to a sanitary sewer, if allowed by the local sewer authority, or to an API or CP oil and water separator followed by a basic treatment BMP (See Volume V), applicable filter, or other equivalent oil treatment system.

Recommended Additional Operational BMPs:

- Consider storing damaged vehicles inside a building or other covered containment, until all liquids are removed. Remove liquids from vehicles retired for scrap.
- Clean parts with aqueous detergent based solutions or non-chlorinated solvents such as kerosene or high flash mineral spirits, and/or use wire brushing or sand blasting whenever practicable. Avoid using toxic liquid cleaners such as methylene chloride, 1,1,1-trichloroethane, trichloroethylene or similar chlorinated solvents. Choose cleaning agents that can be recycled.
- Inspect all BMPs regularly, particularly after a significant storm. Identify and correct deficiencies to ensure that the BMPs are functioning as intended.
- Avoid hosing down work areas. Use dry methods for cleaning leaked fluids.
- Recycle greases, used oil, oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic fluids, transmission fluids, and engine oils (see Appendix IV-C).
- Do not mix dissimilar or incompatible waste liquids stored for recycling.

BMPs for Maintenance of Stormwater Drainage and Treatment Systems

Description of Pollutant Sources: Facilities include roadside catch basins on arterials and within residential areas, conveyance systems, detention facilities such as ponds and vaults, oil and water separators, biofilters, settling basins, infiltration systems, and all other types of stormwater treatment systems presented in Volume V. Roadside catch basins can remove from 5 to 15 percent of the pollutants present in stormwater. When catch basins are about 60 percent full of sediment, they cease removing sediments. Oil and grease, hydrocarbons, debris, heavy metals, sediments and contaminated water are found in catch basins, oil and water separators, settling basins, etc.

Pollutant Control Approach: Provide maintenance and cleaning of debris, sediments, and oil from stormwater collection, conveyance, and treatment systems to obtain proper operation.

Applicable Operational BMPs:

Maintain stormwater treatment facilities according to the O & M procedures presented in Section 4.6 of Volume V in addition to the following BMPs:

- Inspect and clean treatment BMPs, conveyance systems, and catch basins as needed, and determine whether improvements in O & M are needed.
- Promptly repair any deterioration threatening the structural integrity of the facilities. These include replacement of clean-out gates, catch basin lids, and rock in emergency spillways.
- Ensure that storm sewer capacities are not exceeded and that heavy sediment discharges to the sewer system are prevented.
- Regularly remove debris and sludge from BMPs used for peak-rate control, treatment, etc. and discharge to a sanitary sewer if approved by the sewer authority, or truck to a local or state government approved disposal site.
- Clean catch basins when the depth of deposits reaches 60 percent of the sump depth as measured from the bottom of basin to the invert of the lowest pipe into or out of the basin. However, in no case should there be less than six inches clearance from the debris surface to the invert of the lowest pipe. Some catch basins (for example, WSDOT Type 1L basins) may have as little as 12 inches sediment storage below the invert. These catch basins will need more frequent inspection and cleaning to prevent scouring. Where these catch basins are part of a stormwater collection and treatment system, the system owner/operator may choose to concentrate maintenance efforts on downstream control devices as part of a systems approach.

- Clean woody debris in a catch basin as frequently as needed to ensure proper operation of the catchbasin.
- Post warning signs; “Dump No Waste - Drains to Ground Water,” “Streams,” “Lakes,” or emboss on or adjacent to all storm drain inlets *where practical*.
- Disposal of sediments and liquids from the catch basins must comply with “Recommendations for Management of Street Wastes” described in Appendix IV-G of this volume.

Additional Applicable BMPs: Select additional applicable BMPs from this chapter depending on the pollutant sources and activities conducted at the facility. Those BMPs include:

- BMPs for Soil Erosion and Sediment Control at Industrial Sites
- BMPs for Storage of Liquid, Food Waste, or Dangerous Waste Containers
- BMPs for Spills of Oil and Hazardous Substances
- BMPs for Illicit Connections to Storm Drains
- BMPs for Urban Streets.

BMPs for Manufacturing Activities - Outside

Description of Pollutant Sources: Manufacturing pollutant sources include outside process areas, stack emissions, and areas where manufacturing activity has taken place in the past and significant pollutant materials remain and are exposed to stormwater.

Pollution Control Approach: Cover and contain outside manufacturing and prevent stormwater run-on and contamination, where feasible.

Applicable Operational BMP:

- Sweep paved areas regularly, as needed, to prevent contamination of stormwater.

Applicable Structural Source Control BMPs:

- Alter the activity by eliminating or minimizing the contamination of stormwater.
- Enclose the activity (see Figure 2.6): If possible, enclose the manufacturing activity in a building.
- Cover the activity and connect floor drains to a sanitary sewer, if approved by the local sewer authority. Berm or slope the floor as needed to prevent drainage of pollutants to outside areas. (Figure 2.7)
- Isolate and segregate pollutants as feasible. Convey the segregated pollutants to a sanitary sewer, process treatment or a dead-end sump depending on available methods and applicable permit requirements.

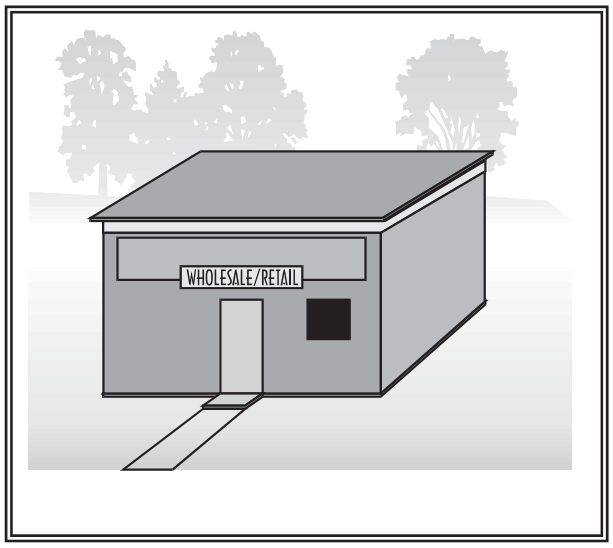


Figure 2.6 – Enclose the Activity

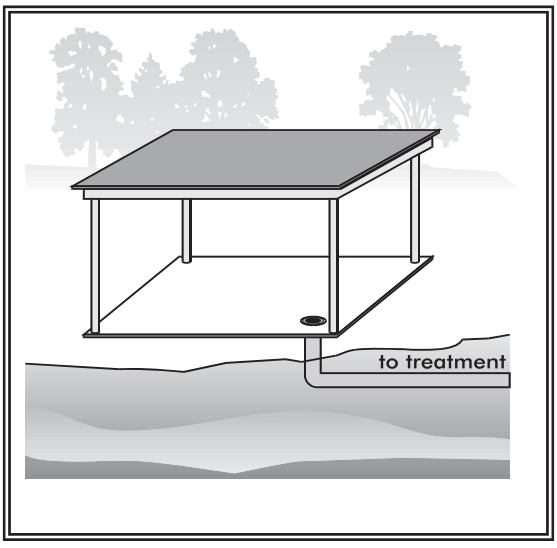


Figure 2.7 – Cover the Activity

fire department need not be covered. Potential spill/leak conveyance surfaces must be impervious and in good repair.

  - Placement of a drip pan, or an absorbent pad under each fueling location prior to and during all dispensing operations. The pan (must be liquid tight) and the absorbent pad must have a capacity of 5 gallons. Spills retained in the drip pan or the pad need not be reported.
  - The handling and operation of fuel transfer hoses and nozzle, drip pan(s), and absorbent pads as needed to prevent spills/leaks of fuel from reaching the ground, storm drains, and receiving waters.
  - Not extending the fueling hoses across a traffic lane without fluorescent traffic cones, or equivalent devices, conspicuously placed so that all traffic is blocked from crossing the fuel hose.
  - Removing the fill nozzle and cessation of filling when the automatic shut-off valve engages. Do not allow automatic shutoff fueling nozzles to be locked in the open position.
  - Not "topping off" the fuel receiving equipment

- Provide the driver/operator of the fueling vehicle with:
  - Adequate flashlights or other mobile lighting to view fill openings with poor accessibility. Consult with local fire department for additional lighting requirements.
  - Two-way communication with his/her home base.
- Train the driver/operator annually in spill prevention and cleanup measures and emergency procedures. Make all employees aware of the significant liability associated with fuel spills.
- The fueling operating procedures should be properly signed and dated by the responsible manager, distributed to the operators, retained in the organization files, and made available in the event an authorized government agency requests a review.
- Ensure that the local fire department (911) and the appropriate regional office of the Department of Ecology are immediately notified in the event of any spill entering the surface or ground waters. Establish a "call down list" to ensure the rapid and proper notification of management and government officials should any significant amount of product be lost off-site. Keep the list in a protected but readily accessible location in the mobile fueling truck. The "call down list" should also pre-identify spill response contractors available in the area to ensure the rapid removal of significant product spillage into the environment.

- Maintain a minimum of the following spill clean-up materials in all fueling vehicles, that are readily available for use:
  - Non-water absorbents capable of absorbing 15 gallons of diesel fuel;
  - A storm drain plug or cover kit;
  - A non-water absorbent containment boom of a minimum 10 feet in length with a 12-gallon absorbent capacity;
  - A non-metallic shovel; and,
  - Two, five-gallon buckets with lids.
- Use automatic shutoff nozzles for dispensing the fuel. Replace automatic shut-off nozzles as recommended by the manufacturer.
- Maintain and replace equipment on fueling vehicles, particularly hoses and nozzles, at established intervals to prevent failures.

Applicable Structural Source Control BMPs: Include the following fuel transfer site components:

- Automatic fuel transfer shut-off nozzles; and,
- An adequate lighting system at the filling point.

BMPs for Parking and Storage of Vehicles and Equipment

Description of Pollutant Sources: Public and commercial parking lots such as retail store, fleet vehicle (including rent-a-car lots and car dealerships), equipment sale and rental parking lots, and parking lot driveways, can be sources of toxic hydrocarbons and other organic compounds, oils and greases, metals, and suspended solids caused by the parked vehicles.

Pollutant Control Approach: If the parking lot is a **high-use site** as defined below, provide appropriate oil removal equipment for the contaminated stormwater runoff.

Applicable Operational BMPs:

- If washing of a parking lot is conducted, discharge the washwater to a sanitary sewer, if allowed by the local sewer authority, or other approved wastewater treatment system, or collect it for off-site disposal.
- Do not hose down the area to a storm drain or to a receiving water. Sweep parking lots, storage areas, and driveways, regularly to collect dirt, waste, and debris.

Applicable Treatment BMPs: An oil removal system such as an API or CP oil and water separator, catch basin filter, or equivalent BMP, approved by the local jurisdiction, is applicable for parking lots meeting the threshold vehicle traffic intensity level of a *high-use site.*

Vehicle High-Use Sites

Establishments subject to a vehicle high-use intensity have been determined to be significant sources of oil contamination of stormwater. Examples of potential high use areas include customer parking lots at fast food stores, grocery stores, taverns, restaurants, large shopping malls, discount warehouse stores, quick-lube shops, and banks. If the PGIS for a high-use site exceeds 5,000 square feet in a threshold discharge area, and oil control BMP from the Oil Control Menu is necessary. A high-use site at a commercial or industrial establishment has one of the following characteristics: (Gaus/King County, 1994)

- Is subject to an expected average daily vehicle traffic (ADT) count equal to or greater than 100 vehicles per 1,000 square feet of gross building area: or
- Is subject to storage of a fleet of 25 or more diesel vehicles that are over 10 tons gross weight (trucks, buses, trains, heavy equipment, etc.).

BMPs for Railroad Yards

Description of Pollutant Sources: Pollutant sources can include drips/leaks of vehicle fluids onto the railroad bed, human waste disposal, litter, locomotive/railcar/equipment cleaning areas, fueling areas, outside material storage areas, the erosion and loss of soil particles from the railroad bed, maintenance and repair activities at railroad terminals, switching yards, and maintenance yards, and herbicides used for vegetation management. Waste materials can include waste oil, solvents, degreasers, antifreeze solutions, radiator flush, acids, brake fluids, soiled rags, oil filters, sulfuric acid and battery sludges, and machine chips with residual machining oil and toxic fluids/solids lost during transit. Potential pollutants include oil and grease, TSS, BOD, organics, pesticides, and metals.

Pollutant Control Approach: Apply good housekeeping and preventive maintenance practices to control leaks and spills of liquids in railroad yard areas.

Applicable Operational and Structural Source Control BMPs:

- Implement the applicable BMPs in this chapter depending on the pollutant generating activities/sources at a railroad yard facility.
- Do not allow discharge to outside areas from toilets while a train is in transit. Pumpout facilities should be used to service these units.
- Use drip pans at hose/pipe connections during liquid transfer and other leak-prone areas.
- During maintenance do not discard debris or waste liquids along the tracks or in railroad yards.

Applicable Treatment BMPs: In areas subjected to leaks/spills of oils or other chemicals convey the contaminated stormwater to appropriate treatment such as a sanitary sewer, if approved by the appropriate sewer authority, or, to a CP or API oil/water separator for floating oils, or other treatment, as approved by the local jurisdiction.

BMPs for Soil Erosion and Sediment Control at Industrial Sites

Description of Pollutant Sources: Industrial activities on soil areas; exposed and disturbed soils; steep grading; etc. can be sources of sediments that can contaminate stormwater runoff.

Pollutant Control Approach: Limit the exposure of erodible soil, stabilize or cover erodible soil where necessary to prevent erosion, and/or provide treatment for stormwater contaminated with TSS caused by eroded soil.

Applicable BMPs:

Cover Practice Options:

- Vegetative cover such as grass, trees, shrubs, on erodible soil areas; or,
- Covering with mats such as clear plastic, jute, synthetic fiber; and/or,
- Preservation of natural vegetation including grass, trees, shrubs, and vines,

Structural Practice Options:

Vegetated swale, dike, silt fence, check dam, gravel filter berm, sedimentation basin, and proper grading. (For design information refer to Volume II, "Standards and Specifications for BMPs").

BMPs for Spills of Oil and Hazardous Substances

Description of Pollutant Sources: Owners or operators of facilities engaged in drilling, producing, gathering, storing, processing, transferring, distributing, refining or consuming oil and/or oil products are required by Federal Law to have a Spill Prevention and Control Plan if the storage capacity of the facility, which is not buried, is 1,320 gallons or more of oil, or any single container with a capacity in excess of 660 gallons and which, due to their location, could reasonably be expected to discharge oil in harmful quantities, as defined in 40 CFR Part 110, into or upon the navigable waters of the United States or adjoining shorelines {40 CFR 112.1 (b)}. Onshore and offshore facilities, which, due to their location, could not reasonably be expected to discharge oil into or upon the navigable waters of the United States or adjoining shorelines are exempt from these regulations {40 CFR 112.1(1)(i)}. Owners of businesses that produce Dangerous Wastes are also required by State Law to have a spill control plan. These businesses should refer to Appendix IV-D R.6. The federal definition of oil is oil of any kind or any form, including, but not limited to petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil.

Pollutant Control Approach: Maintain, update, and implement an oil spill prevention/cleanup plan.

Applicable Operational BMPs: The businesses and public agencies identified in Appendix IV-A that are required to prepare and implement an Emergency Spill Cleanup Plan shall implement the following:

- Prepare an Emergency Spill Control Plan (SCP), which includes:
  - A description of the facility including the owner's name and address;
  - The nature of the activity at the facility;
  - The general types of chemicals used or stored at the facility;
  - A site plan showing the location of storage areas for chemicals, the locations of storm drains, the areas draining to them, and the location and description of any devices to stop spills from leaving the site such as positive control valves;
  - Cleanup procedures;
  - Notification procedures to be used in the event of a spill, such as notifying key personnel. Agencies such as Ecology, local fire department, Washington State Patrol, and the local Sewer Authority, shall be notified;
  - The name of the designated person with overall spill cleanup and notification responsibility;

- Train key personnel in the implementation of the Emergency SCP. Prepare a summary of the plan and post it at appropriate points in the building, identifying the spill cleanup coordinators, location of cleanup kits, and phone numbers of regulatory agencies to be contacted in the event of a spill;
- Update the SCP regularly;
- Immediately notify Ecology and the local Sewer Authority if a spill may reach sanitary or storm sewers, ground water, or surface water, in accordance with federal and Ecology spill reporting requirements;
- Immediately clean up spills. Do not use emulsifiers for cleanup unless an appropriate disposal method for the resulting oily wastewater is implemented. Absorbent material shall not be washed down a floor drain or storm sewer; and,
- Locate emergency spill containment and cleanup kit(s) in high potential spill areas. The contents of the kit shall be appropriate for the type and quantities of chemical liquids stored at the facility.

Recommended Additional Operational BMP: Spill kits should include appropriately lined drums, absorbent pads, and granular or powdered materials for neutralizing acids or alkaline liquids where applicable. In fueling areas: absorbent should be packaged in small bags for easy use and small drums should be available for storage of absorbent and/or used absorbent. Spill kits should be deployed in a manner that allows rapid access and use by employees.

BMPs for Storage of Liquid, Food Waste, or Dangerous Waste Containers

Description of Pollutant Sources: Steel and plastic drums with volumetric capacities of 55 gallons or less are typically used at industrial facilities for container storage of liquids and powders. The BMPs specified below apply to container(s) located outside a building used for temporary storage of accumulated food wastes, vegetable or animal grease, used oil, liquid feedstock or cleaning chemical, or Dangerous Wastes (liquid or solid) unless the business is permitted by Ecology to store the wastes (Appendix IV-D R.4). Leaks and spills of pollutant materials during handling and storage are the primary sources of pollutants. Oil and grease, acid/alkali pH, BOD, COD are potential pollutant constituents.

Pollutant Control Approach: Store containers in impervious containment under a roof or other appropriate cover, or in a building. For roll-containers (for example, dumpsters) that are picked up directly by the collection truck, a filet can be placed on both sides of the curb to facilitate moving the dumpster. If a storage area is to be used on-site for less than 30 days, a portable temporary secondary system like that shown in Figure 2.8 can be used in lieu of a permanent system as described above.

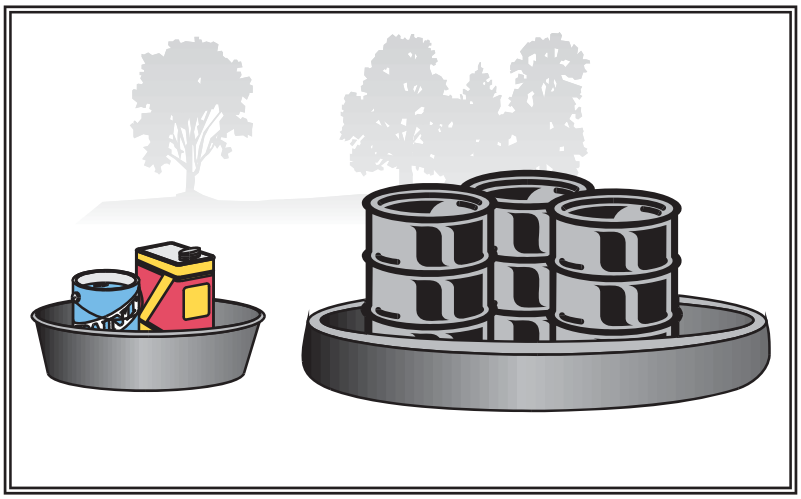


Figure 2.8 – Secondary Containment System

Applicable Operational BMPs:

- Place tight-fitting lids on all containers.
- Place drip pans beneath all mounted container taps and at all potential drip and spill locations during filling and unloading of containers.
- Inspect container storage areas regularly for corrosion, structural failure, spills, leaks, overfills, and failure of piping systems. Check containers daily for leaks/spills. Replace containers, and replace and tighten bungs in drums as needed.
- Businesses accumulating Dangerous Wastes that do not contain free liquids need only to store these wastes in a sloped designated area with

the containers elevated or otherwise protected from storm water run-on.

- Drums stored in an area where unauthorized persons may gain access must be secured in a manner that prevents accidental spillage, pilferage, or any unauthorized use (see Figure 2.9).

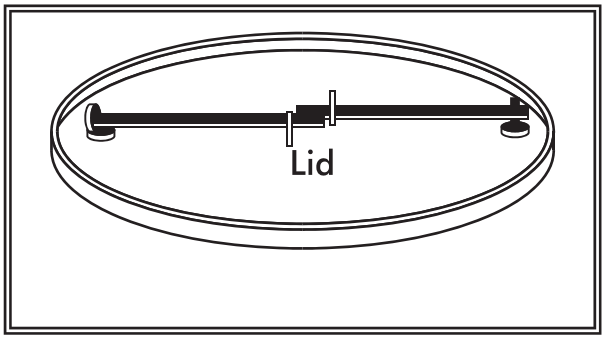


Figure 2.9 – Locking System for Drum Lid

- If the material is a Dangerous Waste, the business owner must comply with any additional Ecology requirements as specified in Appendix IV-D R.3.
- Storage of reactive, ignitable, or flammable liquids must comply with the Uniform Fire Code (Appendix IV-D R.2).
- Cover dumpsters, or keep them under cover such as a lean-to, to prevent the entry of stormwater. Replace or repair leaking garbage dumpsters.
- Drain dumpsters and/or dumpster pads to sanitary sewer. Keep dumpster lids closed. Install waterproof liners.

Applicable Structural Source Control BMPs:

- Keep containers with Dangerous Waste, food waste, or other potential pollutant liquids inside a building unless this is impracticable due to site constraints or Uniform Fire Code requirements.
- Store containers in a designated area, which is covered, bermed or diked, paved and impervious in order to contain leaks and spills (see Figure 2.10). The secondary containment shall be sloped to drain into a dead-end sump for the collection of leaks and small spills.
- For liquid wastes, surround the containers with a dike as illustrated in Figure 2.10. The dike must be of sufficient height to provide a volume of either 10 percent of the total enclosed container volume or 110 percent of the volume contained in the largest container, whichever is greater, or, if a single container, 110 percent of the volume of that container.

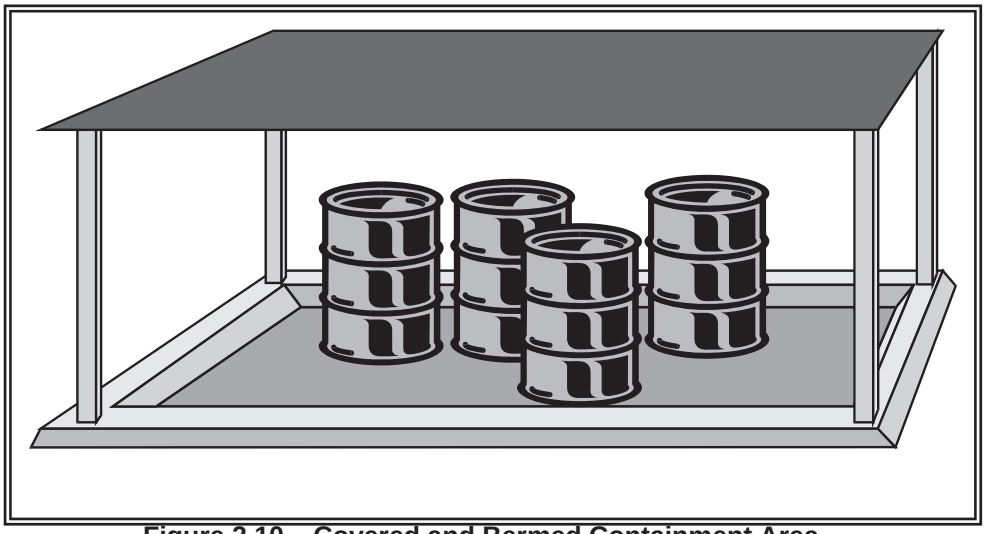


Figure 2.10 – Covered and Bermed Containment Area

- Where material is temporarily stored in drums, a containment system can be used as illustrated, in lieu of the above system (see Figure 2.8).
- Place containers mounted for direct removal of a liquid chemical for use by employees inside a containment area as described above. Use a drip pan during liquid transfer (see Figure 2.11).

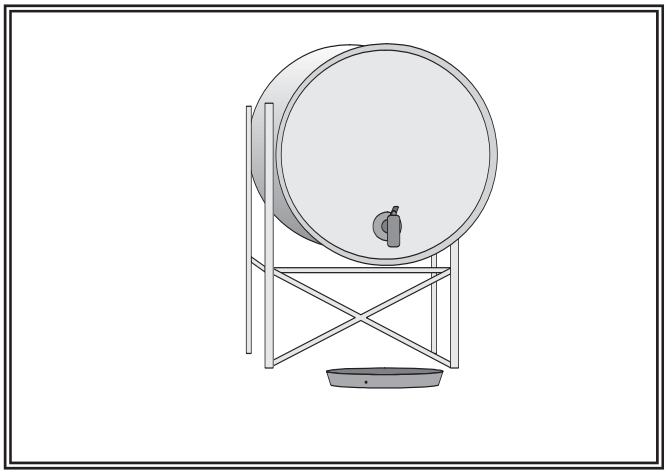


Figure 2.11 – Mounted Container - with drip pan

Applicable Treatment BMP:

Note that a treatment BMP is applicable for contaminated stormwater from drum storage areas.

- For contaminated stormwater in the containment area, connect the sump outlet to a sanitary sewer, if approved by the local Sewer Authority, or to appropriate treatment such as an API or CP oil/water separator, catch basin filter or other appropriate system (see Volume V). Equip the sump outlet with a normally closed valve to prevent the release of spilled or leaked liquids, especially flammables (compliance with Fire Codes), and dangerous liquids. This valve may be opened only for the conveyance of contaminated stormwater to treatment.
- Another option for discharge of contaminated stormwater is to pump it from a dead-end sump or catchment to a tank truck or other appropriate vehicle for off-site treatment and/or disposal.

BMPs for Storage of Liquids in Permanent Above-ground Tanks

Description of Pollutant Sources: Above-ground tanks containing liquids (excluding uncontaminated water) may be equipped with a valved drain, vent, pump, and bottom hose connection. They may be heated with steam heat exchangers equipped with steam traps. Leaks and spills can occur at connections and during liquid transfer. Oil and grease, organics, acids, alkalis, and heavy metals in tank water and condensate drainage can also cause stormwater contamination at storage tanks.

Pollutant Control Approach: Install secondary containment or a double-walled tank. Slope the containment area to a drain with a sump. Stormwater collected in the containment area may need to be discharged to treatment such as an API or CP oil/water separator, or equivalent BMP. Add safeguards against accidental releases including protective guards around tanks to protect against vehicle or forklift damage, and tagging valves to reduce human error. *Tank water and condensate discharges are process wastewater that may need an NPDES Permit.*

Applicable Operational BMPs:

- Inspect the tank containment areas regularly to identify problem components such as fittings, pipe connections, and valves, for leaks/spills, cracks, corrosion, etc.
- Place adequately sized drip pans beneath all mounted taps and drip/spill locations during filling/unloading of tanks. Valved drain tubing may be needed in mounted drip pans.
- Sweep and clean the tank storage area regularly, if paved.
- Replace or repair tanks that are leaking, corroded, or otherwise deteriorating.
- All installations shall comply with the Uniform Fire Code (Appendix IV-D R.2) and the National Electric Code.

Applicable Structural Source Control BMPs:

- Locate permanent tanks in impervious (Portland cement concrete or equivalent) secondary containment surrounded by dikes as illustrated in Figure 2.12, or UL Approved double-walled. The dike must be of sufficient height to provide a containment volume of either 10 percent of the total enclosed tank volume or 110 percent of the volume contained in the largest tank, whichever is greater, or, if a single tank, 110 percent of the volume of that tank.
- Slope the secondary containment to drain to a dead-end sump (optional), or equivalent, for the collection of small spills.
- Include a tank overfill protection system to minimize the risk of spillage during loading.

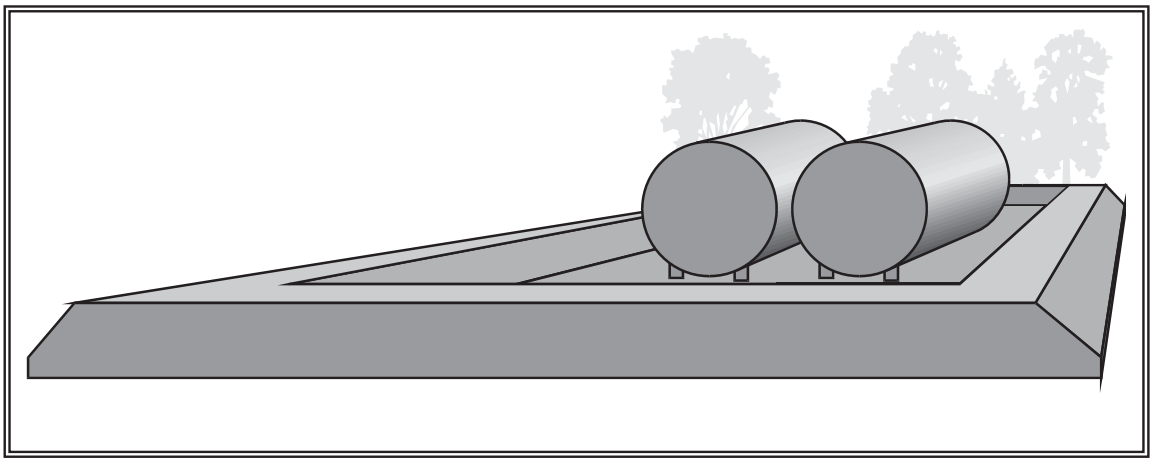


Figure 2.12 – Above-ground Tank Storage

Applicable Treatment BMPs:

Note the applicable treatment BMP for stormwater from petroleum tank farms.

- If the tank containment area is uncovered, equip the outlet from the spill-containment sump with a shutoff valve, which is normally closed and may be opened, manually or automatically, only to convey contaminated stormwater to approved treatment or disposal, or to convey uncontaminated stormwater to a storm drain. Evidence of contamination can include the presence of visible sheen, color, or turbidity in the runoff, or existing or historical operational problems at the facility. Simple pH measurements with litmus or pH paper can be used for areas subject to acid or alkaline contamination.
- At petroleum tank farms, convey stormwater contaminated with floating oil or debris in the contained area through an API or CP-type oil/water separator (Volume V, Treatment BMPs), or other approved treatment prior to discharge to storm drain or surface water.

BMPs for Storage or Transfer (Outside) of Solid Raw Materials, By-Products, or Finished Products

Description of Pollutant Sources: Solid raw materials, by-products, or products such as gravel, sand, salts, topsoil, compost, logs, sawdust, wood chips, lumber and other building materials, concrete, and metal products sometimes are typically stored outside in large piles, stacks, etc. at commercial or industrial establishments. Contact of outside bulk materials with stormwater can cause leachate, and erosion of the stored materials. Contaminants include TSS, BOD, organics, and dissolved salts (sodium, calcium, and magnesium chloride, etc).

Pollutant Control Approach: Provide impervious containment with berms, dikes, etc. and/or cover to prevent run-on and discharge of leachate pollutant(s) and TSS.

Applicable Operational BMP: Do not hose down the contained stockpile area to a storm drain or a conveyance to a storm drain or to a receiving water.

Applicable Structural Source Control BMP Options: Choose one or more of the source control BMP options listed below for stockpiles greater than 5 cubic yards of erodible or water soluble materials such as soil, road deicing salts, compost, unwashed sand and gravel, sawdust, etc. Also included are outside storage areas for solid materials such as logs, bark, lumber, metal products, etc.

- Store in a building or paved and bermed covered area as shown in Figure 2.13, or;

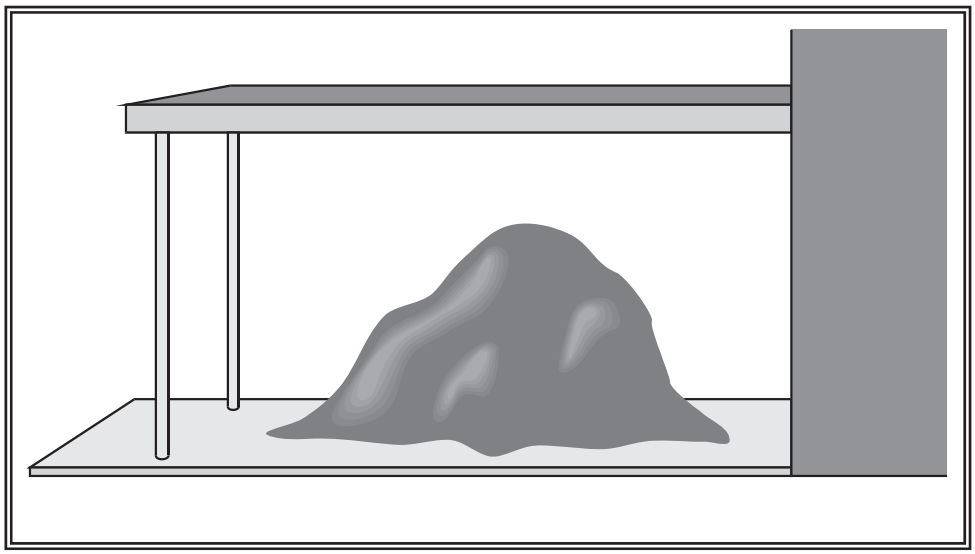


Figure 2.13 – Covered Storage Area for Bulk Solids (include berm if needed)

- Place temporary plastic sheeting (polyethylene, polypropylene, hypalon, or equivalent) over the material as illustrated (see Figure 2.14), or;

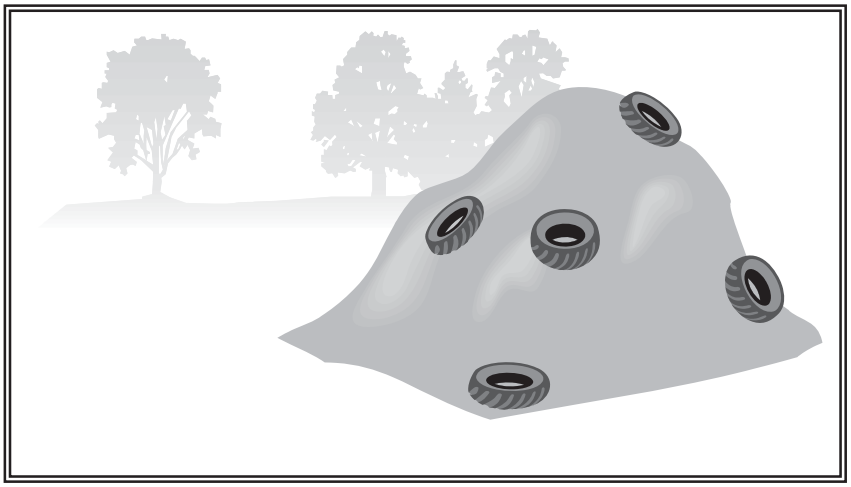


Figure 2.14 – Material Covered with Plastic Sheeting

- Pave the area and install a stormwater drainage system. Place curbs or berms along the perimeter of the area to prevent the run-on of uncontaminated stormwater and to collect and convey runoff to treatment. Slope the paved area in a manner that minimizes the contact between stormwater (e.g., pooling) and leachable materials in compost, logs, bark, wood chips, etc.
- For large stockpiles that cannot be covered, implement containment practices at the perimeter of the site and at any catch basins as needed to prevent erosion and discharge of the stockpiled material offsite or to a storm drain. Ensure that contaminated stormwater is not discharged directly to catch basins without conveying through a treatment BMP.

Applicable Treatment BMP: Convey contaminated stormwater from the stockpile area to a wet pond, wet vault, settling basin, media filter, or other appropriate treatment system depending on the contamination.

Recommended Additional Operational BMPs:

- Maintain drainage areas in and around storage of solid materials with a minimum slope of 1.5 percent to prevent pooling and minimize leachate formation. Areas should be sloped to drain stormwater to the perimeter where it can be collected, or to internal drainage "alleyways" where material is not stockpiled.
- Sweep paved storage areas regularly for collection and disposal of loose solid materials.
- If and when feasible, collect and recycle water-soluble materials (leachates) to the stockpile.
- Stock cleanup materials, such as brooms, dustpans, and vacuum sweepers near the storage area.

APPENDIX 4-B

SPILL CONTROL PLAN

SPILL CONTROL PLAN

All Wood Recycling
Redmond, Washington

Prepared for:

All Wood Recycling (AWR)
Redmond, Washington

August 2011
Prepared by Terra Associates, Inc.

Project No. T-6580

General Information

Spill Response Officer	Mr. Lee Daily, Jr.
Emergency Contact:	Mr. Lee Daily, Jr.
Title:	President
Office Number:	insert

Site Assessment

Surface Conditions/Use Patterns

The site has only one entrance to the site. The site entrance is located immediately adjacent to the site office. Trucks that enter the site pass by the site office. The site is divided by Evans Creek into two distinct area. A concrete bridge spans the creek and provides access to the two portions of the site.

The area south of Evans Creek is paved with concrete and is used for the storage of wood wastes brought onto the site, a shredded and stockpiled shredded wood waste. Wood waste consisting of stumps, logs, and untreated used milled lumber is brought to the site where it is shredded and sold to local industrial facility is for use as wood wastes fuel. Treated wood is not accepted on-site.

There are also services of buildings that are occupied by AWR, a site care taker, a tenant space. The ground surface south of Evans Creek is paved with concrete. Stormwater is collected and directed to a subsurface vault. Water from the vault is pumped to the northern part of the site to an existing permitted drain field for infiltration.

The area north of Evans Creek is used for the storage of concrete rubble brought on-site from construction sites and is crushed to provide a recycled construction material. Asphaltic concrete from road construction projects is also brought on-site, crushed, and sold as a recycled construction material. There is neither a concrete nor an asphaltic concrete plant on-site.

Spill Control Plan

General

All Wood Recycling shall retain this Spill Control Plan on-site or within reasonable access to the site and make it immediately available, upon request, to Ecology or the City of Redmond.

Spill History

Two spills have been documented to have occurred at the All Wood Recycling that required remedial measures. Both spills were cleaned up.

Inventory

With the exception of the fuel in the mobile fuel truck and aggregates, the materials contained in Table 1 are kept within covered storage areas and are not exposed to stormwater runoff or precipitation.

Inventory of Materials

Material Type	Location	Exposure
Aggregate and wood waste Piles	Stockpiles located in the active area of the site.	At all times.
Fuel	Delivered by contract service to stationary fuel facility.	If spilled during fueling and maintenance outside.
Oil	Delivered to site, used and stored in covered storage area.	If spilled during maintenance outside.
Waste Oil	Stored in covered storage area. Removed by contract service.	If spilled during transfer.
Grease/Hydraulic oil	Delivered to site, used and stored in covered storage area.	If spilled during maintenance outside.

Pollution Prevention Team

The pollution prevention team and responsibilities are presented in the following table.

Pollution Prevention Team

Roles	Name	Position	Responsibilities
Spill Response Officer	Lee Daily	President	Primary contact for spills, prepare spill reports, update spill plan.
Employee Training	Lee Daily	President	Provide annual training to employees on SWPPP.
BMP Inspections	Lee Daily	President	Ensure inspections are performed and reports are prepared.
BMP Maintenance	Lee Daily	President	Perform required maintenance of BMPs.
Record Keeping	Lee Daily	President	Maintain inspection, maintenance, monitoring reports, and SWPPP plan update records.

Inspections and Preventative Maintenance

Routine maintenance and cleanup of catch basins, ditches, pump stations, oil/water separators, swales, fueling areas, maintenance areas, equipment parking areas, and asphalt storage and processing areas is important in reducing the potential for polluting the stormwater. The following table identifies maintenance items, activities, frequencies, and employees responsible for the activity.

Maintenance and Cleanup

Item	Activity	Frequency	Employee Responsible for Activity
Site area	Inspect for oily stains, spills, and debris, clean as needed.	One in wet season, one in dry, and as needed.	Lee Daily
Equipment and Vehicle Parking Areas	Inspect for oily stains, spills, and debris, clean as needed.	One in wet season, one in dry, or as needed.	Lee Daily
Equipment Fueling	Inspect for oily stains, spills, and debris, clean as needed.	After each spill event.	Lee Daily
Roadways	Remove sediment and oil stains.	One in wet season, one in dry, or as needed.	Lee Daily
Oil/Water Separators	Inspect, remove oil and sediment.	One in wet season, one in dry, or as needed.	Lee Daily

Spill Response Procedures

When spills occur, employees are to:

1. Immediately notify a supervisor that a spill has occurred. If a supervisor is not available, notify the Spill Response Officer. Tell the supervisor what, where, and how much is spilled. The supervisor will inform the Spill Response Officer.

2. The Spill Response Officer will instruct the supervisor and employee on initial response procedures and contact appropriate emergency services and agencies.

3. The Spill Response Officer will then review the spill and perform appropriate cleanup procedures.

4. The Spill Response Officer will then prepare appropriate incident documentation.

The Spill Response Officer will make the determination if the spill is reportable to government agencies. If the spill is determined to be reportable due to its size and/or possible environmental impacts or hazards to life or safety, the following agencies will be contacted:

Fire and Emergency Response 911

Then

National Response Center: 1-800-424-8802
AND
Washington Emergency Management Division: 1-800-258-5990 OR 1-800-OILS-911
AND
Northwest Region of Ecology
1-425-649-7000

The following information should be reported:

- Where is the spill?
- What spilled?
- How much spilled?
- How concentrated is the spilled material?
- Who spilled the material?
- Is anyone cleaning up the spill?
- Are there resource damages (e.g. dead fish or oiled birds)?
- Who is reporting the spill?
- How can we get back to you?

Spilled materials will be contained, segregated from unaffected media, and protected from rainfall and/or surface water runoff to prevent further spreading of the spilled material. Disposal options will be determined based upon the quantity of the spilled material, the nature of the spilled material, and the quantity of affected media.

BMPs in Use

The following sections present the BMPs that are in use on the site.

Pollution Prevention Team

- All Wood Recycling has assigned individuals to be responsible for stormwater pollution control. These individuals will hold regular meetings to review the overall operation of the BMPs, establish responsibilities for inspections, operation and maintenance, availability for emergency situations, and train all team members in the operation, maintenance and inspections of BMPs, and reporting procedures.

- Promptly contain and cleanup solid and liquid pollutant leaks and spills including oils, solvents, fuels, and dust from maintenance operations on any exposed soil, vegetation, or paved area.

- Sweep the maintenance area regularly as needed, for the collection and disposal of dust and debris that could contaminate stormwater. Do not hose down pollutants from any area to the ground, storm drain, conveyance ditch, or receiving water unless necessary for dust control purposes to meet air quality regulations.

- Clean oils, debris, sludge, etc. from all BMP systems regularly, including catch basins, settling/detention basins, oil/water separators, boomed areas, and conveyance systems, to prevent the contamination of stormwater.

- Promptly repair or replace all leaking connections, pipes, hoses, valves, etc., which can contaminate stormwater.

- Cleanup pollutant liquid leaks and spills in impervious uncovered containment areas at the end of each working day.

- Use solid absorbents, e.g., clay and peat absorbents and rags for cleanup of liquid spills/leaks, where practicable.

- Recycle materials, such as oils, solvents, and wood waste, to the maximum extent practicable.

- Prevent the discharge of unpermitted liquid or solid wastes, process wastewater, and sewage to ground or surface water, or to storm drains, which discharge to surface water, or to the ground.

- Do not connect floor drains in potential pollutant source areas to storm drains, surface water, or to the ground.

- Conduct all oily parts cleaning, steam cleaning, or pressure washing of equipment or containers inside a building, or on an impervious contained area, such as a concrete pad. Direct contaminated stormwater from such an area to other approved treatment devices or have vacuum service come to vac up the contaminated water.

- Do not pave over contaminated soil unless it has been determined that groundwater has not been and will not be contaminated by the soil. Call Ecology for assistance.

- Use drip pans to collect leaks and spills from excavating equipment, trucks, and other vehicles, which are stored outside.

- Drain oil and fuel filters before disposal. Discard empty oil and fuel filters, oily rags, and other oily solid waste into appropriately closed and properly labeled containers, and in compliance with the Uniform Fire Code.
- For the storage of liquids use containers, such as steel and plastic drums, that are rigid and durable, corrosion resistant to the weather and fluid content, non-absorbent, water tight, rodent-proof, and equipped with a close fitting cover.
- For the temporary storage of solid wastes contaminated with liquids or other potential pollutant materials use dumpsters, garbage cans, drums, and comparable containers, which are durable, corrosion resistant, non-absorbent, non-leaking, and equipped with a solid cover.
- Where exposed to stormwater, use containers, piping, tubing, pumps, fittings, and valves that are appropriate for their intended use and for the contained liquid.
- Where feasible, store potential stormwater pollutant materials inside a building or under a cover and/or containment.
- Minimize use of toxic cleaning solvents, such as chlorinated solvents, and other toxic chemicals.
- Use environmentally safer raw materials, products, additives, etc. such as substitutes for zinc used in rubber production.
- Recycle waste materials such as solvents, coolants, oils, degreasers, and batteries to the maximum extent feasible.
- Empty drip pans into appropriate containers with compatible wastes.
- Clean secondary containment of accumulated sludges and liquids on a regular basis.

Mobile Fueling of Vehicles and Heavy Equipment

- Mobile fueling is only conducted using diesel fuel.
- Proper training of the fueling operator, and the use of spill/drip control and reliable fuel transfer equipment with backup shutoff valving are typically needed.
- The operating procedures for the driver/operator should be simple, clear, effective, and their implementation verified by the individuals listed as being responsible parties in this document.
- Ensure the presence and the constant observation/monitoring of the driver/operator at the fuel transfer location at all times during fuel transfer and ensure that the following procedures are implemented at the fuel transfer locations:
    - Placement of a drip pan, or an absorbent pad under each fueling location prior to and during all dispensing operations. The pan (must be liquid tight) and the absorbent pad must have a capacity of five gallons. Spills retained in the drip pan or the pad need not be reported.
    - The handling and operation of fuel transfer hoses and nozzle, drip pan(s), and absorbent pads as needed to prevent spills/leaks of fuel from reaching the ground, storm drains, and receiving waters.

- Not extending the fueling hoses across a traffic lane without fluorescent traffic cones, or equivalent devices, conspicuously placed so that all traffic is blocked from crossing the fuel hose.
- Removing the fill nozzle and cessation of filling when the automatic shut-off valve engages. Do not allow automatic shutoff fueling nozzles to be locked in the open position.
- Not "topping off" the fuel receiving equipment.

- Provide the driver/operator of the fueling vehicle with:
  - Adequate flashlights or other mobile lighting to view fill openings with poor accessibility. Consult with local fire department for additional lighting requirements.
  - Two-way communication with his/her home base.
- Train the driver/operator annually in spill prevention and cleanup measures and emergency procedures. Make all employees aware of the significant liability associated with fuel spills.
- The fueling operating procedures should be properly signed and dated by the responsible manager, distributed to the operators, retained in the organization files, and made available in the event an authorized government agency requests a review.
- Ensure that the local fire department (911) and the appropriate regional office of the Department of Ecology are immediately notified in the event of any spill entering the surface or groundwaters.
- Maintain a minimum of the following spill clean-up materials in all fueling vehicles that are readily available for use:
  - Non-water absorbents capable of absorbing 15 gallons of diesel fuel.
  - A storm drain plug or cover kit.
  - A non-water absorbent containment boom of a minimum 10 feet in length with a 12-gallon absorbent capacity.
  - A non-metallic shovel.
  - Two, five-gallon buckets with lids.
- Use automatic shutoff nozzles for dispensing the fuel. Replace automatic shut-off nozzles as recommended by the manufacturer.
- Maintain and replace equipment on fueling vehicles, particularly hoses and nozzles, at established intervals to prevent failures.

Maintenance and Repair of Vehicles and Equipment

- Inspect for leaks all incoming vehicles, parts, and equipment stored temporarily outside.
- Use drip pans or containers under parts or vehicles that drip or that are likely to drip liquids, such as during dismantling of liquid containing parts or removal or transfer of liquids.
- Remove batteries and liquids from vehicles and equipment in designated areas designed to prevent stormwater contamination. Store cracked batteries in a covered non-leaking secondary containment system.
- All Wood Recycling will empty oil and fuel filters before disposal and provide for proper disposal of waste oil and fuel.

- All Wood Recycling will not pour/convey wash water, liquid waste, or other pollutant into storm drains or to surface water.
- All Wood Recycling will not install floor drains in the covered maintenance building.
- Remove liquids from vehicles retired for scrap.
- Clean parts with aqueous detergent based solutions or non-chlorinated solvents such as kerosene or high flash mineral spirits, and/or use wire brushing or sand blasting whenever practicable. Avoid using toxic liquid cleaners such as methylene chloride, 1,1,1-trichloroethane, trichloroethylene, or similar chlorinated solvents. Choose cleaning agents that can be recycled.
- Inspect all BMPs regularly, particularly after a significant storm. Identify and correct deficiencies to ensure that the BMPs are functioning as intended.
- Avoid hosing down work areas. Use dry methods for cleaning leaked fluids.
- Recycle greases, used oil, oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic fluids, transmission fluids, and engine oils.
- Do not mix dissimilar or incompatible waste liquids stored for recycling.
- Conduct all maintenance and repair of vehicles and equipment in a building, or other covered impervious containment area that is sloped to prevent run-on of uncontaminated stormwater and runoff of contaminated stormwater.

Storage of Liquid, Oils, or Dangerous Waste Containers

- Store containers in impervious containment under a roof or other appropriate cover, or in a building.
- Place tight-fitting lids on all containers.
- Place drip pans beneath all mounted container taps and at all potential drip and spill locations during filling and unloading of containers.
- Inspect container storage areas regularly for corrosion, structural failure, spills, leaks, overfills, and failure of piping systems. Check containers daily for leaks/spills. Replace containers, and replace and tighten bungs in drums as needed.
- Keep the containers elevated or otherwise protected from stormwater run-on.
- Drums stored in an area where unauthorized persons may gain access must be secured in a manner that prevents accidental spillage, pilferage, or any unauthorized use.
- If the material is a Dangerous Waste, Ecology requirements will be followed.
- Storage of reactive, ignitable, or flammable liquids must comply with the Uniform Fire Code.
- Cover dumpsters, or keep them under cover such as a lean-to, to prevent the entry of stormwater. Replace or repair leaking garbage dumpsters.
- Keep containers with Dangerous Waste, or other potential pollutant liquids inside a building unless this is impracticable due to site constraints or Uniform Fire Code requirements.
- Store containers in a designated area, which is covered, bermed or diked, paved, and impervious in order to contain leaks and spills. The secondary containment shall be sloped to drain into a dead-end sump for the collection of leaks and small spills.

BMP Maintenance

All *BMPs* shall be inspected, maintained, and repaired to assure continued performance of their intended function.

Records Maintenance

All spills will be reported to Lee Daily. Spills that require the removal of more than a cubic yard of soil will be recorded. Documentation of the complete cleanup of the spill may require soil sampling. Spills that affect surface water or that could potentially affect groundwater will require notification of the Washington State Department of Ecology.

Plan Updates

This plan is not intended to be a static plan. The spill control plan will be reviewed on an annual basis or as warranted by changes in site use and will be updated as needed.

SECTION 5

MINIMUM REQUIREMENT #4

PRESERVATION OF NATURAL DRAINAGE SYSTEMS AND OUTFALLS

NATURAL DRAINAGE COURSE DESCRIPTION

The natural drainage course for the entire site is to drain directly to Evans Creek and the adjacent wetland. With this in mind, the entire site is considered to be within a single threshold discharge area.

We are proposing treating flows from a high intensity use site to “enhanced treatment” standards and percolate flows into the ground after treatment. The facility is designed to infiltrate the full 50-year design storm event without overtopping. Flowrates above this rate will discharge to the nearby wetlands through an emergency overflow structure.

SECTION 6

MINIMUM REQUIREMENT #5

ON-SITE STORMWATER MANAGEMENT

Existing Site Hydrology

Stormwater runoff from the project site currently flows thru a series of pipes, catch basins, and overland flow into an underground wetvault for treatment. The vault discharges to a structure with a down-turned elbow to provide additional oil-water separation, then into a pump chamber manhole where flows are pressurized up into a 5000 gallon holding tank. A second pump discharges from the holding tank to the existing 1.5-inch force main, which crosses the creek into a permitted class-5 injection well (infiltration trench).

Developed Site Hydrology

The proposed drainage improvements will relocate the existing above-ground tank outside of the 25' Evans Creek buffer. The tank will also be taken off-line, and a new pump will be installed inside the underground treatment vault, with capacity to convey the peak 50-year design flowrate. The pump will discharge to a 4-inch ductile iron force main, which will convey runoff to a new bioinfiltration pond on the north side of Evans Creek. The pond will provide enhanced treatment, and is designed to infiltrate the full 50-year design storm.

Performance Standards

Flow Control and Stormwater Quality elements are subject to the requirements of the 2005 Washington State Department of Ecology Stormwater Management Manual for the Puget Sound Basin. WWHM3 Continuous Stormwater Modeling software was used to calculate tributary flowrates for pump sizing and pond detention volume

SECTION 7

MINIMUM REQUIREMENT #6

RUNOFF TREATMENT

PROJECT RUNOFF TREATMENT DESIGN OVERVIEW

The existing project site includes an underground wetvault, which utilizes several flow control elbows and oil booms. As has been discussed with the City of Redmond, this system is not conventional so is very difficult to provide calculations justifying its functional ability. It is also noteworthy that oil/water separation systems are designed based on droplet size and viscosity. Pollutants on this site consist of diesel fuel, lubricating oil, hydraulic fluids, etc., all in very low concentrations and all with varying characteristics.

Infiltration is feasible at the project site, and will be utilized to be consistent with the Treatment Facility Selection Flow Chart in the 2005 DOE Stormwater Management Manual for Western Washington. The project proposes a bioinfiltration facility downstream of the existing underground vault, which is designed to accommodate the full 50-year design storm event. This will allow the existing vault to serve as a pre-settling basin and oil-water separation device. In addition to the pre-settling and oil/water separation benefits, the existing vault will provide a flow control benefit, by introducing a lag in travel time between the tributary basin and detention facility. Additional discussion of this benefit is provided in Section 8.

INFILTRATION/DETENTION SYSTEM PERFORMANCE CRITERIA

Per the 2005 DOE manual, section 3.3.4:

> **2. Estimate volume of stormwater, Vdesign:**
>
> For western Washington, a continuous hydrograph should be used, requiring use of an approved continuous runoff model such as WWHM, MGSFlood, or KCRTS for the calculations. The runoff file developed for the project site serves as input to the infiltration basin.
>
> For infiltration basins sized simply to meet treatment requirements, the basin must successfully infiltrate 91% of the influent runoff file. The remaining 9% of the influent file can bypass the infiltration facility. However, if the bypass discharges to a surface water that is not exempt from flow control, the bypass must meet the flow control standard.
>
> For infiltration basins sized to meet the flow control standard, the basin must infiltrate either all of the influent file, or a sufficient amount of the influent file such that any overflow/bypass meets the flow duration standard.

The proposed infiltration facility has been designed to infiltrate the full 50-yr design storm, which exceeds the required performance criteria. With this in mind, calculation of the minimum required treatment flows was not necessary.

SECTION 8

MINIMUM REQUIREMENT #7

FLOW CONTROL

Existing Site Hydrology

Stormwater runoff from the project site currently flows thru a series of pipes, catch basins, and overland flow into an underground wet vault for treatment. From the wet vault, water continues into an oil water separator, and then into a pump chamber manhole where flows are pressurized up into a 5000 gallon holding tank, then pressurized again thru a force main out of the holding tank and across the creek into a permitted class 5 injection well (infiltration trench).

Developed Site Hydrology

Proposed drainage improvements include relocation of the existing above ground tank (currently inside the 25' natural Evans Creek buffer) to be outside the buffer. The tank will remain connected to the underground vault, to draw water for use by the property owner, but will be taken off-line from the stormwater conveyance system. A new pump will be installed in the downstream chamber of the existing vault. This pump will discharge to a new 4-inch ductile iron force main which will convey runoff north of Evans Creek, to a new bioinfiltration pond. The pond is intended to provide enhanced treatment in addition to a flow control benefit. The pond has been designed to detain and infiltrate the full 50-year design storm event.

The storm drainage model used for the bioinfiltration pond design does not account for the proposed pump, since the pump could eventually be replaced in the future. This also provides a conservative estimate of system performance, because it does not take advantage of the lag in travel time that occurs as the existing vault is filled up and pumped out. The sizing calculations for the pond were performed using the open pond node in WWHM 3, with the infiltration feature activated. The pond design is done using a long term infiltration rate of 1.0 inches per hour, and a safety factor of 2, this infiltration rate corresponds to the DOE rate for 6" of topsoil in the pond. Pond sizing calculations are provided in Appendix 8-A.

The proposed pump has been sized to convey the full 50-year peak design flowrate. Design calculations for the pump have been included in Appendix 8-B.

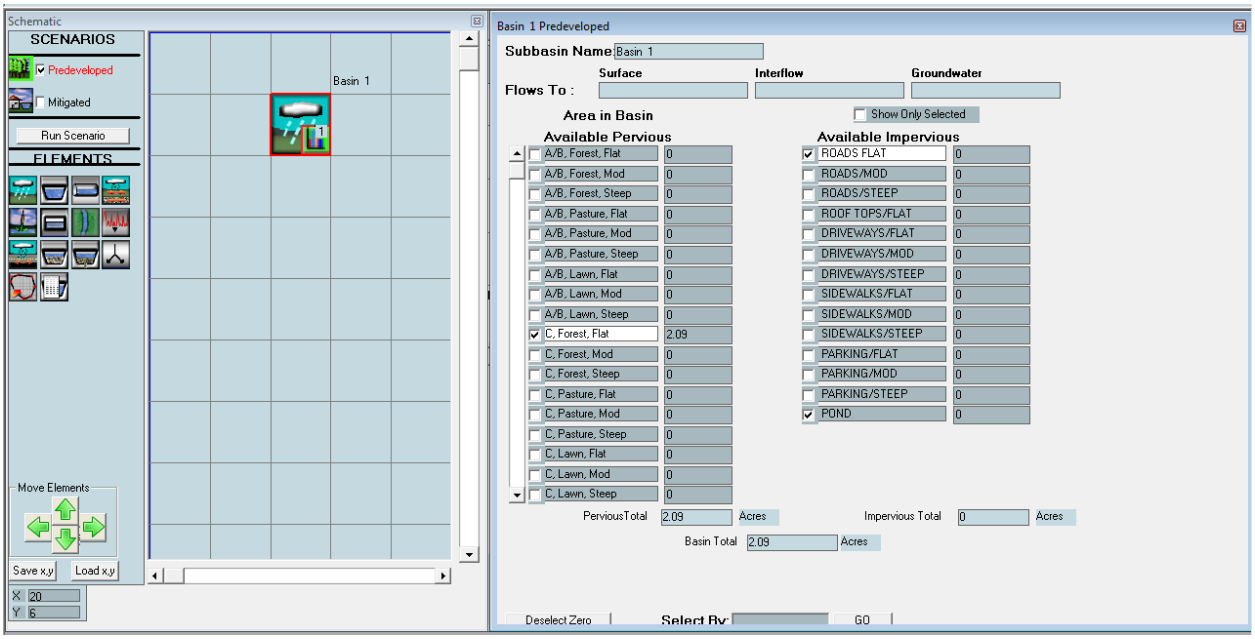
Performance Standards

Flow Control and Stormwater Quality elements are subject to the requirements of the 2005 Washington State Department of Ecology Stormwater Management Manual for the Puget Sound Basin. The modeling software used for both water quality treatment design flows and volumes, and detention volume calculations and release rates is version 3.0 of the WWHM3 Continuous Stormwater Modeling Software.

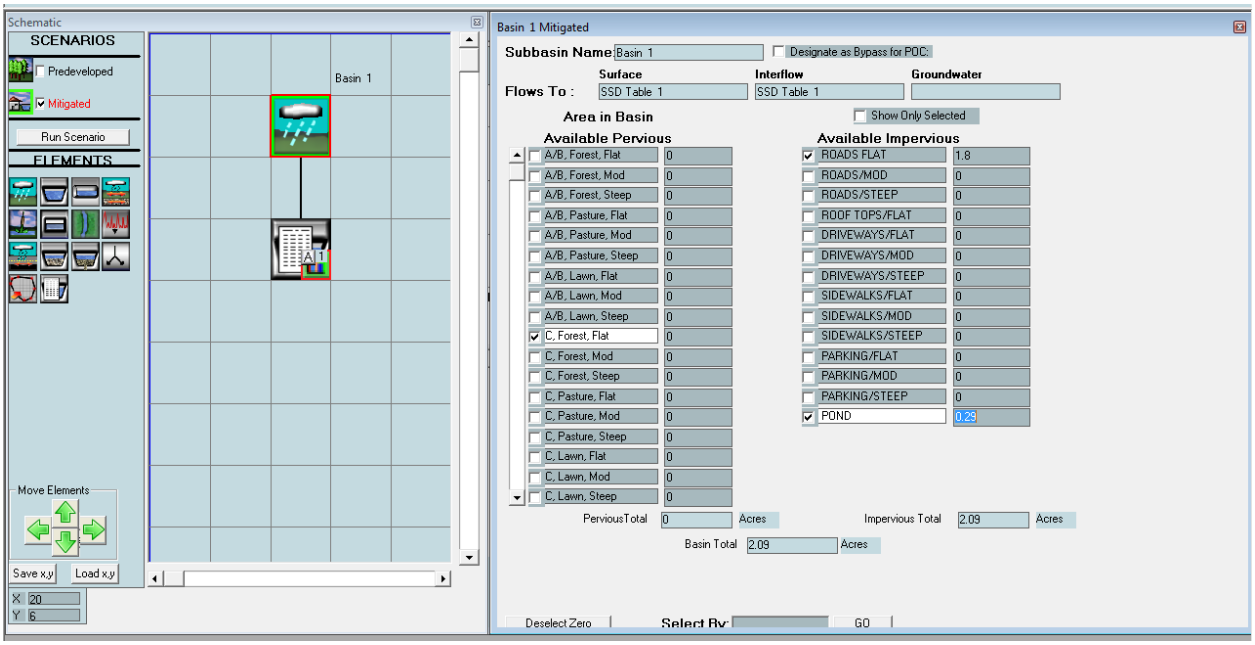
APPENDIX 8-A

FLOW CONTROL
DESIGN CALCULATIONS

Existing Site Conditions



Developed Site Conditions



Stage/Storage/Discharge Calculations

The table below provides a tabulation of the bioinfiltration pond characteristics used for flow control design. The data in the table is derived as follows:

Column 1: Contour Elevation – Measured at the bottom of the pond at each 0.5-ft interval

Column 2: Contour Area – Measured from AutoCAD design drawing

Column 3: Contour Area – Converted from sq. ft. to acres for WWHM input

Column 4: Incremental Volume – Volume between previous contour area and current contour area

Column 5: Cumulative Volume – Total storage volume below the current contour

Column 6: Discharge Rate – Calculated discharge rate through overflow riser, using the overflow Spillway design equations provided in the DOE and King County stormwater manuals.

Column 7: Infiltration Rate – Area of the pond floor multiplied by the design infiltration rate (0.5 in/hr)

(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
Contour Elevation	***Contour Area***	***Contour Area***	***Incremental Volume***	***Cumulative Volume***	***Discharge Rate***	***Infiltration Rate***
(ft)	(ft^2)	(ac)	(ac-ft)	(ac-ft)	(cfs)	(cfs)
60.8	7,404	0.17	0.00	0.00	0	0.09
61.0	7,625	0.18	0.04	0.04	0	0.09
61.5	8,180	0.19	0.09	0.13	0	0.09
62.0	8,753	0.20	0.10	0.23	0	0.09
62.5	9,343	0.21	0.10	0.33	0	0.09
63.0	9,950	0.23	0.11	0.44	0	0.09
63.5	10,574	0.24	0.12	0.56	0	0.09
64.0	11,215	0.26	0.13	0.69	13.77	0.09
64.5	11,868	0.27	0.13	0.82	38.96	0.09

Western Washington Hydrology Model
PROJECT REPORT

Project Name: All Wood
Site Address:
City : Redmond
Report Date : 2/26/2013
Gage : Seatac
Data Start : 1948/10/01
Data End : 1998/09/30
Precip Scale: 1.00
WWHM3 Version:

PREDEVELOPED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	Acres
C, Forest, Flat	2.09

Impervious Land Use	Acres

Element Flows To:

Surface	Interflow	Groundwater

MITIGATED LAND USE

Name : Basin 1
Bypass: No

GroundWater: No

Pervious Land Use	Acres

Impervious Land Use	Acres
ROADS FLAT	1.8
POND	0.29

Element Flows To:

Surface	Interflow	Groundwater
SSD Table 1,	SSD Table 1,	

Name : SSD Table 1
Depth: 3.7ft.

Element Flows To:
Outlet 1 **Outlet 2**

SSD Table Hydraulic Table

Stage(ft)	Area(acr)	Volume(acr-ft)	Dschrg(cfs)	Infilt(cfs)
0.000	0.170	0.000	0.000	0.090
0.200	0.180	0.040	0.000	0.090
0.700	0.190	0.130	0.000	0.090
1.200	0.200	0.230	0.000	0.090
1.700	0.210	0.330	0.000	0.090
2.200	0.230	0.440	0.000	0.090
2.700	0.240	0.560	0.000	0.090
3.200	0.260	0.690	13.77	0.090
3.700	0.270	0.820	38.96	0.090

ANALYSIS RESULTS

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.0526
5 year	0.081507
10 year	0.097171
25 year	0.113092
50 year	0.122545
100 year	0.130313

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.560544
5 year	0.682941
10 year	0.762176
25 year	0.861155
50 year	0.934444
100 year	1.007591

Yearly Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1950	0.060	735.672
1951	0.103	0.000
1952	0.131	0.000
1953	0.040	0.000
1954	0.031	0.000
1955	0.046	0.000
1956	0.081	0.000
1957	0.066	0.000
1958	0.051	0.000
1959	0.057	0.000
1960	0.047	0.000

1961	0.081	0.000
1962	0.048	0.000
1963	0.028	0.000
1964	0.038	0.000
1965	0.047	0.000
1966	0.035	0.000
1967	0.036	0.000
1968	0.078	0.000
1969	0.048	0.000
1970	0.047	0.000
1971	0.036	0.000
1972	0.034	0.000
1973	0.095	0.000
1974	0.043	0.000
1975	0.045	0.000
1976	0.065	0.000
1977	0.043	0.000
1978	0.004	0.000
1979	0.036	0.000
1980	0.022	0.000
1981	0.064	0.000
1982	0.034	0.000
1983	0.059	0.000
1984	0.058	0.000
1985	0.037	0.000
1986	0.020	0.000
1987	0.102	0.000
1988	0.085	0.000
1989	0.031	0.000
1990	0.020	0.000
1991	0.135	0.000
1992	0.119	0.122
1993	0.039	0.000
1994	0.045	0.000
1995	0.011	0.000
1996	0.064	0.000
1997	0.124	0.000
1998	0.114	0.355
1999	0.023	0.000

Ranked Yearly Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.1347	735.6720
2	0.1314	0.3550
3	0.1236	0.1225
4	0.1190	0.0000
5	0.1142	0.0000
6	0.1032	0.0000
7	0.1016	0.0000
8	0.0955	0.0000
9	0.0848	0.0000
10	0.0814	0.0000
11	0.0806	0.0000
12	0.0777	0.0000
13	0.0662	0.0000
14	0.0651	0.0000

15	0.0637	0.0000
16	0.0636	0.0000
17	0.0602	0.0000
18	0.0593	0.0000
19	0.0577	0.0000
20	0.0569	0.0000
21	0.0509	0.0000
22	0.0477	0.0000
23	0.0475	0.0000
24	0.0475	0.0000
25	0.0471	0.0000
26	0.0470	0.0000
27	0.0459	0.0000
28	0.0454	0.0000
29	0.0448	0.0000
30	0.0434	0.0000
31	0.0426	0.0000
32	0.0404	0.0000
33	0.0387	0.0000
34	0.0376	0.0000
35	0.0371	0.0000
36	0.0365	0.0000
37	0.0360	0.0000
38	0.0357	0.0000
39	0.0350	0.0000
40	0.0343	0.0000
41	0.0337	0.0000
42	0.0312	0.0000
43	0.0310	0.0000
44	0.0279	0.0000
45	0.0233	0.0000
46	0.0220	0.0000
47	0.0201	0.0000
48	0.0197	0.0000
49	0.0113	0.0000
50	0.0043	0.0000

POC #1

The Facility PASSED.

Flow(CFS)	Predev	Dev	Percentage	Pass/Fail
0.0263	3892	15	0	Pass
0.0273	3599	15	0	Pass
0.0282	3365	12	0	Pass
0.0292	3145	12	0	Pass
0.0302	2933	12	0	Pass
0.0312	2733	12	0	Pass
0.0321	2560	12	0	Pass
0.0331	2390	12	0	Pass
0.0341	2226	12	0	Pass
0.0350	2085	12	0	Pass
0.0360	1959	12	0	Pass
0.0370	1849	12	0	Pass
0.0380	1746	12	0	Pass
0.0389	1658	12	0	Pass

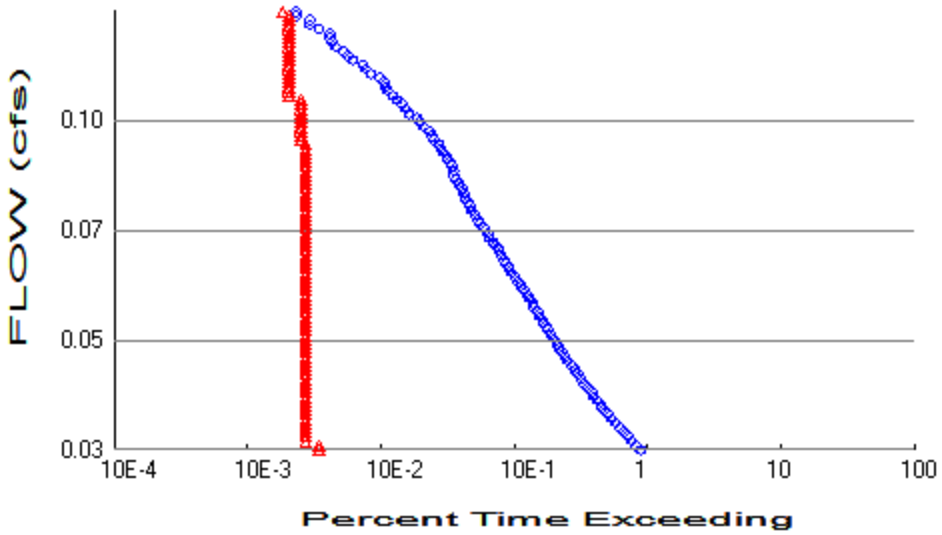
0.0399	1568	12	0	Pass
0.0409	1473	12	0	Pass
0.0419	1390	12	0	Pass
0.0428	1308	12	0	Pass
0.0438	1245	12	0	Pass
0.0448	1183	12	1	Pass
0.0457	1113	12	1	Pass
0.0467	1056	12	1	Pass
0.0477	1008	12	1	Pass
0.0487	949	12	1	Pass
0.0496	912	12	1	Pass
0.0506	874	12	1	Pass
0.0516	825	12	1	Pass
0.0525	782	12	1	Pass
0.0535	751	12	1	Pass
0.0545	715	12	1	Pass
0.0555	681	12	1	Pass
0.0564	658	12	1	Pass
0.0574	622	12	1	Pass
0.0584	602	12	1	Pass
0.0594	571	12	2	Pass
0.0603	549	12	2	Pass
0.0613	521	12	2	Pass
0.0623	492	12	2	Pass
0.0632	468	12	2	Pass
0.0642	443	12	2	Pass
0.0652	423	12	2	Pass
0.0662	402	12	2	Pass
0.0671	383	12	3	Pass
0.0681	365	12	3	Pass
0.0691	350	12	3	Pass
0.0700	338	12	3	Pass
0.0710	318	12	3	Pass
0.0720	302	12	3	Pass
0.0730	283	12	4	Pass
0.0739	275	12	4	Pass
0.0749	259	12	4	Pass
0.0759	244	12	4	Pass
0.0769	234	12	5	Pass
0.0778	222	12	5	Pass
0.0788	212	12	5	Pass
0.0798	204	12	5	Pass
0.0807	198	12	6	Pass
0.0817	187	12	6	Pass
0.0827	183	12	6	Pass
0.0837	177	12	6	Pass
0.0846	168	12	7	Pass
0.0856	161	12	7	Pass
0.0866	155	12	7	Pass
0.0875	154	12	7	Pass
0.0885	149	12	8	Pass
0.0895	143	12	8	Pass
0.0905	137	12	8	Pass
0.0914	131	12	9	Pass
0.0924	124	12	9	Pass
0.0934	119	12	10	Pass
0.0944	110	11	10	Pass

0.0953	106	11	10	Pass
0.0963	102	11	10	Pass
0.0973	92	11	11	Pass
0.0982	86	11	12	Pass
0.0992	82	11	13	Pass
0.1002	71	11	15	Pass
0.1012	67	11	16	Pass
0.1021	63	11	17	Pass
0.1031	58	11	18	Pass
0.1041	54	9	16	Pass
0.1050	50	9	18	Pass
0.1060	48	9	18	Pass
0.1070	46	9	19	Pass
0.1080	43	9	20	Pass
0.1089	37	9	24	Pass
0.1099	34	9	26	Pass
0.1109	32	9	28	Pass
0.1119	27	9	33	Pass
0.1128	25	9	36	Pass
0.1138	23	9	39	Pass
0.1148	20	9	45	Pass
0.1157	19	9	47	Pass
0.1167	18	9	50	Pass
0.1177	18	9	50	Pass
0.1187	15	9	60	Pass
0.1196	13	9	69	Pass
0.1206	13	9	69	Pass
0.1216	10	9	90	Pass
0.1225	10	8	80	Pass

Water Quality BMP Flow and Volume for POC 1.
On-line facility volume: 0.0739 acre-feet
On-line facility target flow: 0.01 **cfs.**
Adjusted for 15 min: 0.2675 **cfs.**
Off-line facility target flow: 0.1816 **cfs.**
Adjusted for 15 min: 0.2052 **cfs.**

Perlnd and Implnd Changes

No changes have been made.



The following flow frequency table has been copied and pasted from WWHM to compare the pre-developed flowrates to the discharge rates from the bioinfiltration pond. The pre-developed flows are reported in the "0501" column, and the discharge rates from the proposed pond are reported in the "0801" column. The purpose of this table is to verify that the pond can infiltrate the full 50-year design storm event.

Flow Frequency Flow(CFS)	0501	0801
2 Year =	0.0526	0.0000
5 Year =	0.0815	0.0000
10 Year =	0.0972	0.0000
25 Year =	0.1131	0.0000
50 Year =	0.1225	0.0000
100 Year =	0.1303	0.0000

Note that the discharge rates for all storm events are reported as 0.0000 cfs. This column does not include infiltration, only flows that are discharged through the overflow riser. The absence of any flow through the overflow riser indicates that all stormwater is infiltrated.

APPENDIX 8-B

PUMP SIZING CALCULATIONS

Design Flowrate

Design Flowrate (Q) =	0.86	cfs	[50-yr peak flow, per WWHM Calculation]
	386	gpm	[50-yr peak flow, converted to gpm]

Static Head

Start Elevation (Z_1) =	51.50	ft	[Elevation at bottom of vault]
End Elevation (Z_2) =	62.70	ft	[Maximum water surface elevation of pond]
Static Head (h_S) =	11.20	ft	[Calculated, Z_2 - Z_1]

Friction Head

(Using Hazen-Williams Equation for Head Loss in Pipes)

Pipe Diameter (D) =	4	in	[Force main diameter, per plan]
Pipe Length (L) =	566	ft	[Force main length, per plan]
Friction Coef (C_h) =	120		[Hazen-Williams Coef. for small-diam pipe]
Pipe Area (A) =	0.26	ft	[Cross-sectional area of pipe, A = $\pi D^2/4$]
Flow Velocity (V) =	3.28	ft	[Full-flow pipe velocity, V = Q/A]
Friction Head (h_f) =	7.92	ft	$\left[h_f = 3.02LD^{-1.167}\left(\frac{V}{C_h}\right)^{1.85}\right]$

Fitting/Transition Head

Fitting	Qty	K_b	h_L	
90° Bend	0	0.35	0.00	ft
45° Bend	5	0.1	0.00	ft
Total Transition Head =			0.00	ft

Total Dynamic Head

Static Head =	11.20	[from above]
Friction Head =	7.92	[from above]
Transition Head =	0.00	[from above]
Total Dynamic Head =	**19.12** ft	

TSURUMI PUMP

CONTRACTOR PUMPS & GENERATORS

BUILT FOR WORK

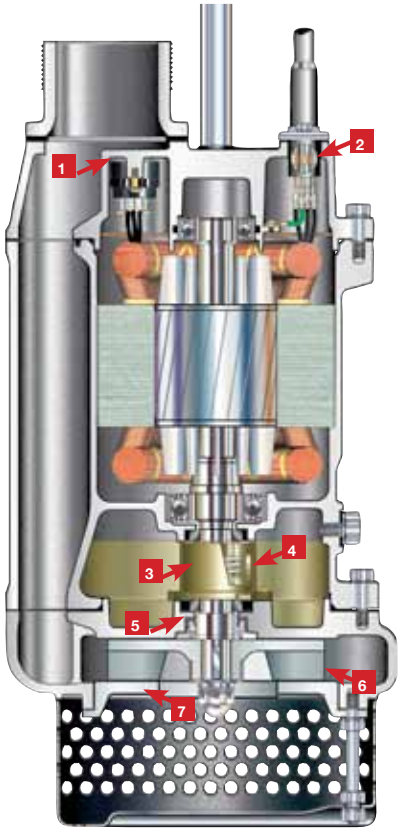
Electric Submersible Pumps • Engine Driven Pumps • Generators • Accessories

www.tsurumipump.com

Electric Submersible Pumps

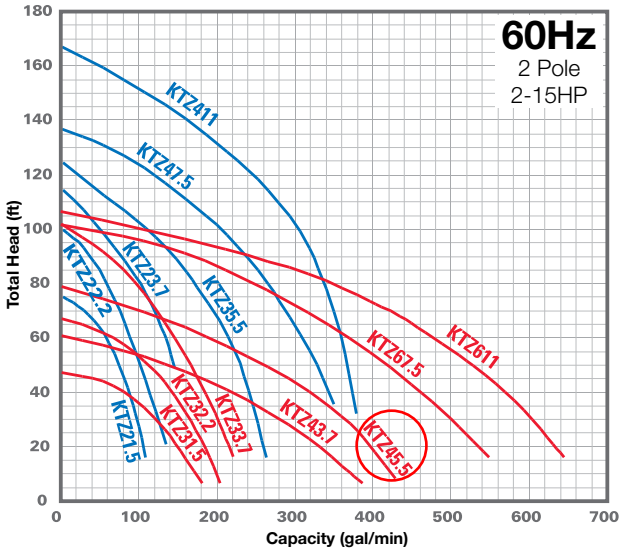
KTZ THREE PHASE DEWATERING PUMPS

Designed to withstand the most demanding conditions found in the construction, aggregate and mining markets. Tsurumi KTZ Series dewatering pump easily converts between high head and high volume performance with a simple change of impeller and wear plate. Wide range of sizes for any job.



KTZ Series Features

1. Circle Thermal Motor Protector: Protects against, overheating over amperage & run-dry.
2. Anti-Wicking Block: Prevents water incursion due to capillary wicking, should the power cable be damaged or the end submerged.
3. Oil Lifter: Lubrication of the seal faces down to 1/3 of normal oil level and extends seal life by ten times—uses no additional power.
4. Dual Inside Mechanical Seal with Silicon Carbide Faces: Provides longer operational life of any seal available.
5. Lip Seal Protector: Protects mechanical seal from abrasive particles.
6. High Chrome Iron Semi-Open Impeller: Resists wear by abrasive particles.
7. Field Adjustable/Replaceable, Ductile Iron Wear Plate: Resists wear by abrasive particles, and is easily adjusted to maintain pump performance.



Certified by Intertek Testing Service to UL and CSA standards for submersible construction pumps.

Model	Motor Output (HP)	Phase	Discharge Bore (inch)	Cable Length (ft)	Dimension (inch)		Continuous Running Water Level (inch)	Pump Weight (lbs.)
					Diameter	Height		
KTZ21.5	2	Three	2	50	9 1/4	21 9/16	4 3/4	66
KTZ31.5	2	Three	3	50	9 1/4	21 9/16	4 3/4	66
KTZ22.2	3	Three	2	50	9 1/4	22 3/8	4 3/4	75
KTZ32.2	3	Three	3	50	9 1/4	22 3/8	4 3/4	75
KTZ23.7	5	Three	2	50	11 1/8	25 1/16	5 7/8	139
KTZ33.7	5	Three	3	50	11 1/8	25 1/16	5 7/8	139
KTZ43.7	5	Three	4	50	11 1/8	25 1/16	5 7/8	139
KTZ35.5	7 1/2	Three	3	50	12 1/16	27 1/16	5 7/8	181
KTZ45.5	7 1/2	Three	4	50	12 1/16	27 1/16	5 7/8	181
KTZ47.5	10	Three	4	50	13	28 1/8	7 1/2	231
KTZ67.5	10	Three	4 or *6	50	13	28 1/8 or 30 11/16	7 1/2	236
KTZ411	15	Three	4	50	14 11/16	31 3/4	7 1/2	293
KTZ611	15	Three	4 or *6	50	14 11/16	31 3/4 or 30 3/16	7 1/2	300

*6 " Discharge Bore for KTZ67.5 & KTZ611 is optional

KTZ Series

		KTZ21.5	KTZ22.2	KTZ23.7	KTZ31.5	KTZ32.2	KTZ33.7	KTZ35.5	KTZ43.7	KTZ45.5	KTZ47.5	KTZ411	KTZ67.5	KTZ611
		Water Resistant Pumps												
FLUID	Max. Capacity (GPM)	106	132	143	180	203	219	260	386	428	349	377	549	645
	Max. Head (ft.)	75	100	115	47	67	102	125	61	79	137	167	102	107
	Solid Diameter (inches)	5/16											13/16	
PUMP	Impeller Type	Semi-Open												
	Impeller Material	High Chrome												
	Casing Material	Cast Iron												
	Wear Plate Material	Ductile Cast Iron												
	Shaft Seal - Type / Material	Double inside mechanical seal with Silicon Carbide												
	Seal Lubricant - Type	SAE 10W/20W or Turbine Oil (ISO VG32)												
	Seal Lubricant - Amount (ounces)	25.0	25.0	40.6	25.0	25.0	40.6	37.2	40.6	37.2	25.7	25.7	25.7	25.7
	Seal Protection	Lip Seal and Oil Lifter (Oil Lifter is patented by Tsurumi Pump)												
	Discharge Connection	2" NPT Coupling			3" NPT Coupling				4" NPT Coupling				4" NPT Coupling (6" is optional)	
MOTOR	Motor Output (hp)	2	3	5	2	3	5	7.5	5	7.5	10	15	10	15
	Phase	Three												
	Voltage (V)	208-230 / 460 / 575												
	Amperage - Rated Current	6.2-6.0/ 3.1/2.3	9.4-9.0/ 4.5/3.5	15.0-13.6/ 6.8/5.3	6.2-6.0/ 3.1/2.3	9.4-9.0/ 4.5/3.5	15.0-13.6/ 6.8/5.3	21.0-20.0/ 10.0/7.9	15.0-13.6/ 6.8/5.3	21.0-20.0/ 10.0/7.9	28.8-26.6/ 13.3/10.4	40.0-37.6/ 18.6/14.9	28.8-26.6/ 13.3/10.4	40.0-37.6/ 18.6/14.9
	Amperage - Starting Current	44/22/16	46/38/28	120/60/43	44/22/16	46/38/28	120/60/43	170/85/62	120/60/43	170/85/62	236/118/ 85	310/155/ 120	236/118/ 85	310/155/ 120
	Type	Continuous duty, Air filled, 3600RPM, 60Hz												
	Bearings	Double shielded, permanentary lubricated												
	Insulation Class	F												
	Motor Protection (Built-In)	Circle Thermal Protector												
	Plug Configuration (Nema)	No Plug												
	Cable - #of Conductors x AWG	4Cx16AWG	4Cx16AWG	4Cx14AWG	4Cx16AWG	4Cx16AWG	4Cx14AWG	4Cx12AWG	4Cx14AWG	4Cx12AWG	4Cx10AWG	4Cx8AWG	4Cx10AWG	4Cx8AWG
	Standard Cable Length (ft.)	50												
	Max. Cable Length (ft.)	130 (230V) 610 (460V) 670 (575V)	90 (230V) 400 (460V) 440 (575V)	90 (230V) 450 (460V) 460 (575V)	130 (230V) 610 (460V) 670 (575V)	90 (230V) 400 (460V) 440 (575V)	90 (230V) 450 (460V) 460 (575V)	110 (230V) 540 (460V) 590 (575V)	90 (230V) 450 (460V) 460 (575V)	110 (230V) 540 (460V) 590 (575V)	130 (230V) 650 (460V) 690 (575V)	130 (230V) 650 (460V) 690 (575V)	130 (230V) 650 (460V) 690 (575V)	130 (230V) 650 (460V) 690 (575V)
	Recommended Generator Capacity	8800	12400	19100	8800	12400	19100	27600	19100	27600	38300	53700	38300	53700
	Optional Float Switch	N/A												
DIMENSION	Diameter (inches)	9 1/4	9 1/4	11 1/8	9 1/4	9 1/4	11 1/8	12 1/16	11 1/8	12 1/16	13	14 11/16	13	14 11/16
	Height (inches)	21 9/16	22 3/8	25 1/16	21 9/16	22 3/8	25 1/16	27 1/16	25 1/16	27 1/16	28 1/8	31 3/4	28 1/8 or 30 11/16	31 3/4 or 30 3/16
	Continuous Running Water Level (in.)	4 3/4	4 3/4	5 7/8	4 3/4	4 3/4	5 7/8	5 7/8	5 7/8	5 7/8	7 1/2	7 1/2	7 1/2	7 1/2
	Pump Weight (lbs.)	66	75	139	66	75	139	181	139	181	231	293	236	300

Sand Kit Model: K15-SK

The Sand Kit can be added to the NK Series to suspend sand and prevent sand lock.

Residue Kit Model: HS-RK

Available for the HS2.4S, the Residue Kit allows pumping of residual water down to 0.4 inches.

Wheel Kit & Lifting Bail

Wheel Kit PGWK-200
for TPG3 Series Generator & Gas Engine Pumps

Wheel Kit PGWK-11K
for TPG-11000HDXE

Lifting Bail
PGLB-1

For All Generators, Gas Engine Pumps: Wheel Kit PGWK-200 / PGWK-11K and Lifting Bail PGLB-1

Heavy-duty and easy to install our wheel kits and lifting bails fit all of Tsurumi Generators.

Control Panels

For NK, KTZ, LH, and LHW Series

MANUAL CONTROL PANEL INCLUDES:

- Manual Simplex Operation.
- Nema 4X, Lockable Fiberglass Enclosure.
- IEC Contactor.
- Hand/Off Selector Switch.
- UL Listed.
- Cable Grips In Control Panel.

AUTOMATIC CONTROL PANEL INCLUDES:

- Automatic or Manual Simplex Operation.
- Nema 4X, Lockable Fiberglass Enclosure.
- IEC Rated Magnetic Contactor.
- Hand/Off Auto Selector Switch.
- UL Listed.
- Includes (2) 20 Ft. Mechanical Float Switches.
- Cable Grips In Control Panel.

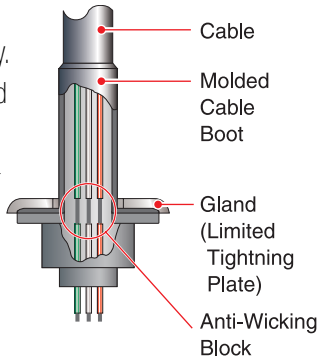
Inverter Panels are available for LHW and KTZ series Single Phase operation.

TSURUMI PUMP

SUPERIOR DESIGN & TECHNOLOGY

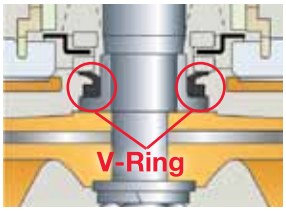
Anti-Wicking Cable Entrance: Maximum protection against water incursion through the cable entry.

- Molded Cable Boot or Cable Protection Tube - extends cable bending radius, prevents abrading, and reduces fatigue.
- Cable Gland - provides 360 degree compression of cable boot, protection tube or cable bush for a water tight fit.
- Anti-Wicking Block - window cuts on conductor insulation expose strands to molded rubber or epoxy to prove water wicking through the strands and entering the motor providing protection even if the cable insulation is cut.

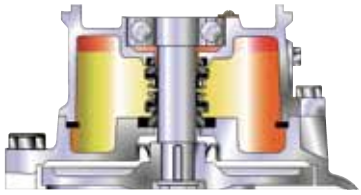


Circle Thermal Protector (CTP) *- for pumps with 1-10HP*: 3-Pole protector connects to each winding of the motor and reacts to excessive heat and amperage. Automatic reset at safe temperature to restart the motor. No motor protection circuit required in starter or control panel.

V-Ring: V-Ring is mounted at the top of the impeller and is brought in close contact to the bottom of the mechanical seal by the internal pressure of the pump casing. This V-Ring acts as a dust seal to prevent fine abrasive particles in the pumping fluid from reaching the mechanical seal.

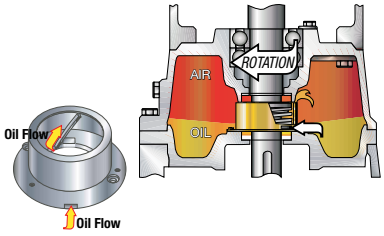


High-Performance Motor:
Dry type, squirrel-cage, induction motor, housed in a watertight casing, conforms to either insulation class B or E, or F. In both of these classes, all standard pumps can be used in ambient temperature up to 104°F (40°C).



Dual Inside, Silicon Carbide Mechanical Seals:
Isolation of mechanical seals in an oil chamber provides a clean, non-corrosive and abrasion free lubricating environment to prevent spring failure due to corrosion or abrasion and bottom seal failure due to loss of cooling during dry-run conditions.

Oil Lifter (Patented): Tsurumi's exclusive Oil Lifter encloses the mechanical seal and uses the centrifugal force generated by the rotating shaft and seal to pump oil to the upper seal faces. Upper and lower seal faces are positively lubricated even when extremely low oil levels exist, as experienced after long periods of extended operation.



TSURUMI PUMP

For Sales, Service, and Specifications, call:
1-888-TSURUMI (878-7864)

TSURUMI (AMERICA), INC.
1625 Fullerton Court
Glendale Heights, IL 60139
Tel: 1-888-878-7864 (Toll-Free)
1-630-793-0127
Fax: 1-630-793-0146

TSURUMI (AMERICA), INC. WEST
6216 West 9790 South
West Jordan, UT 84081
Tel: 1-800-748-4458 (Toll-Free)
1-801-563-5910
Fax: 1-801-563-5911

Your Dealer

MAY12

Visit our website: www.tsurumipump.com

SECTION 9

MINIMUM REQUIREMENT #8

WETLANDS PROTECTION

PROJECT OVERVIEW

We are hydrating the wetlands as they are being hydrated now, and consistent with the conditions of the Shoreline Permit.

SECTION 10

MINIMUM REQUIREMENT #9

BASIN/WATERSHED PLANNING

BASIN/WATERSHED PLANNING

We are hydrating the wetlands as they are being hydrated now, and consistent with the conditions of the Shoreline Permit. There are no other applicable basin/watershed plans for the project.

SECTION 11

MINIMUM REQUIREMENT #10

OPERATION AND MAINTENANCE

Operation and Maintenance Section:

No. 1 – Detention Ponds

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	Any trash and debris which exceed 5 cubic feet per 1,000 square feet (this is about equal to the amount of trash it would take to fill up one standard size garbage can). In general, there should be no visual evidence of dumping. If less than threshold all trash and debris will be removed as part of next scheduled maintenance.	Trash and debris cleared from site.
	Poisonous Vegetation and noxious weeds	Any poisonous or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined by State or local regulations. (Apply requirements of adopted IPM policies for the use of herbicides).	No danger of poisonous vegetation where maintenance personnel or the public might normally be. (Coordinate with local health department) Complete eradication of noxious weeds may not be possible. Compliance with State or local eradication policies required
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants (Coordinate removal/cleanup with local water quality response agency).	No contaminants or pollutants present.
	Rodent Holes	Any evidence of rodent holes if facility is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.	Rodents destroyed and dam or berm repaired. (Coordinate with local health department; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
	Beaver Dams	Dam results in change or function of the facility.	Facility is returned to design function. (Coordinate trapping of beavers and removal of dams with appropriate permitting agencies)
	Insects	When insects such as wasps and hornets interfere with maintenance activities.	Insects destroyed or removed from site. Apply insecticides in compliance with adopted IPM policies
	Tree Growth and Hazard Trees	Tree growth does not allow maintenance access or interferes with maintenance activity (i.e., slope mowing, silt removal, vactoring, or equipment movements). If trees are not interfering with access or maintenance, do not remove If dead, diseased, or dying trees are identified (Use a certified Arborist to determine health of tree or removal requirements)	Trees do not hinder maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses (e.g., alders for firewood). Remove hazard Trees
Side Slopes of Pond	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. Any erosion observed on a compacted berm embankment.	Slopes should be stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction. If erosion is occurring on compacted berms a licensed civil engineer should be consulted to resolve source of erosion.
Storage Area	Sediment	Accumulated sediment that exceeds 10% of the designed pond depth unless otherwise specified or affects inletting or outletting condition of the facility.	Sediment cleaned out to designed pond shape and depth; pond reseeded if necessary to control erosion.
	Liner (If Applicable)	Liner is visible and has more than three 1/4-inch holes in it.	Liner repaired or replaced. Liner is fully covered.

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
Pond Berms (Dikes)	Settlements	Any part of berm which has settled 4 inches lower than the design elevation. If settlement is apparent, measure berm to determine amount of settlement. Settling can be an indication of more severe problems with the berm or outlet works. A licensed civil engineer should be consulted to determine the source of the settlement.	Dike is built back to the design elevation.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Goethechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Overflow/ Spillway and Berms over 4 feet in height.	Tree Growth	Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping. Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm.	Trees should be removed. If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A licensed civil engineer should be consulted for proper berm/spillway restoration.
	Piping	Discernable water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Goethechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	Piping eliminated. Erosion potential resolved.
Emergency Overflow/ Spillway	Emergency Overflow/ Spillway	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of out flow path of spillway. (Rip-rap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standards.
	Erosion	See “Side Slopes of Pond”	

No. 4 – Control Structure/Flow Restrictor

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris (Includes Sediment)	Material exceeds 25% of sump depth or 1 foot below orifice plate.	Control structure orifice is not blocked. All trash and debris removed.

	Structural Damage	Structure is not securely attached to manhole wall.	Structure securely attached to wall and outlet pipe.
		Structure is not in upright position (allow up to 10% from plumb).	Structure in correct position.
		Connections to outlet pipe are not watertight and show signs of rust.	Connections to outlet pipe are water tight; structure repaired or replaced and works as designed.
		Any holes--other than designed holes--in the structure.	Structure has no holes other than designed holes.
Cleanout Gate	Damaged or Missing	Cleanout gate is not watertight or is missing.	Gate is watertight and works as designed.
		Gate cannot be moved up and down by one maintenance person.	Gate moves up and down easily and is watertight.
		Chain/rod leading to gate is missing or damaged.	Chain is in place and works as designed.
		Gate is rusted over 50% of its surface area.	Gate is repaired or replaced to meet design standards.
Orifice Plate	Damaged or Missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
Manhole	See “Closed Detention Systems” (No. 3).	See “Closed Detention Systems” (No. 3).	See “Closed Detention Systems” (No. 3).
Catch Basin	See “Catch Basins” (No. 5).	See “Catch Basins” (No. 5).	See “Catch Basins” (No. 5).

No. 5 – Catch Basins

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
General	Trash & Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%.	No Trash or debris located immediately in front of catch basin or on grate opening.
		Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe.	No trash or debris in the catch basin.

		Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	Inlet and outlet pipes free of trash or debris.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch (Intent is to make sure no material is running into basin).	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards.
		Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Pipe is regrouted and secure at basin wall.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation	Vegetation growing across and blocking more than 10% of the basin opening.	No vegetation blocking opening to basin.
		Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation or root growth present.

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is performed
	Contamination and Pollution	See "Detention Ponds" (No. 1).	No pollution present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is closed
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. (Intent is keep cover from sealing off access to maintenance.)	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing.	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.

No. 5 – Catch Basins

Maintenance Components	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash and Debris	Trash or debris that is plugging more than 20% of the openings in the barrier.	Barrier cleared to design flow capacity.
Metal	Damaged/ Missing Bars.	Bars are bent out of shape more than 3 inches.	Bars in place with no bends more than 3/4 inch.
		Bars are missing or entire barrier missing.	Bars in place according to design.
		Bars are loose and rust is causing 50% deterioration to any part of barrier.	Barrier replaced or repaired to design standards.
	Inlet/Outlet Pipe	Debris barrier missing or not attached to pipe	Barrier firmly attached to pipe

No. 2 – Infiltration

Maintenance Component	Defect	Conditions When Maintenance Is Needed	Results Expected When Maintenance Is Performed
General	Trash & Debris	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Poisonous/Noxious Vegetation	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Contaminants and Pollution	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Rodent Holes	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1)
Storage Area	Sediment	Water ponding in infiltration pond after rainfall ceases and appropriate time allowed for infiltration. (A percolation test pit or test of facility indicates facility is only working at 90% of its designed capabilities. If two inches or more sediment is present, remove).	Sediment is removed and/or facility is cleaned so that infiltration system works according to design.
Filter Bags (if applicable)	Filled with Sediment and Debris	Sediment and debris fill bag more than 1/2 full.	Filter bag is replaced or system is redesigned.
Rock Filters	Sediment and Debris	By visual inspection, little or no water flows through filter during heavy rain storms.	Gravel in rock filter is replaced.
Side Slopes of Pond	Erosion	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
Emergency Overflow Spillway and Berms over 4 feet in height.	Tree Growth	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Piping	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
Emergency Overflow Spillway	Rock Missing	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
	Erosion	See "Detention Ponds" (No. 1).	See "Detention Ponds" (No. 1).
Pre-settling Ponds and Vaults	Facility or sump filled with Sediment and/or debris	6" or designed sediment trap depth of sediment.	Sediment is removed.

No. 12 – Wetvaults

Maintenance Component	Defect	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
General	Trash/Debris Accumulation	Trash and debris accumulated in vault, pipe or inlet/outlet (includes floatables and non-floatables).	Remove trash and debris from vault.
	Sediment Accumulation in Vault	Sediment accumulation in vault bottom exceeds the depth of the sediment zone plus 6-inches.	Remove sediment from vault.
	Damaged Pipes	Inlet/outlet piping damaged or broken and in need of repair.	Pipe repaired and/or replaced.
	Access Cover Damaged/Not Working	Cover cannot be opened or removed, especially by one person.	Pipe repaired or replaced to proper working specifications.
	Ventilation	Ventilation area blocked or plugged.	Blocking material removed or cleared from ventilation area. A specified % of the vault surface area must provide ventilation to the vault interior (see design specifications).
	Vault Structure Damage - Includes Cracks in Walls Bottom, Damage to Frame and/or Top Slab	Maintenance/inspection personnel determine that the vault is not structurally sound.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound.
		Cracks wider than 1/2-inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	Vault repaired so that no cracks exist wider than 1/4-inch at the joint of the inlet/outlet pipe.
	Baffles	Baffles corroding, cracking, warping and/or showing signs of failure as determined by maintenance/inspection staff.	Baffles repaired or replaced to specifications.
	Access Ladder Damage	Ladder is corroded or deteriorated, not functioning properly, not attached to structure wall, missing rungs, has cracks and/or misaligned. Confined space warning sign missing.	Ladder replaced or repaired to specifications, and is safe to use as determined by inspection personnel. Replace sign warning of confined space entry requirements. Ladder and entry notification complies with OSHA standards.

SECTION 12

SPECIAL REPORTS AND STUDIES

APPENDIX 12-A

GEOTECHNICAL REPORT

TERRA ASSOCIATES, Inc.

Consultants in Geotechnical Engineering, Geology
and
Environmental Earth Sciences

November 21, 2011
Project No. T-6580

Mr. Lee Daily
All Wood Recycling
8504 – 192nd Avenue NE
Redmond, Washington 98053

Subject: Revised Technical Memorandum
Hydrogeologic Assessment
All Wood Recycling
504 – 192nd Avenue NE
Redmond, Washington

Dear Mr. Daily:

This letter transmits our hydrogeologic assessment for your existing facility. This memo is a revision of our memo dated August 29, 2011. This memo adds a discussion of monitoring wells within a 1,300-foot radius of the site. This assessment includes Best Management Practices and a Spill Control Plan based on your current operations on-site.

We appreciate the opportunity to work with you on this project. If you have any questions or require additional information, please call.

Sincerely yours,
TERRA ASSOCIATES, INC.

Charles R. Lie, L.H.G.
Project Manager

Attachments: Appendix A – Boring Logs by Others
Appendix B – Olympic Precast Groundwater Data
Appendix C – BMPs
Appendix D – Spill Control Plan

cc: Mr. Andrew S. Lane, *Attorney*, Cairncross & Hempelmann
Mr. Andrew Reaves, SDA

12525 Willows Road, Suite 101, Kirkland, Washington 98034
Phone (425) 821-7777 • Fax (425) 821-4334

Technical Memorandum
Hydrogeologic Assessment
All Wood Recycling
504 – 192nd Avenue NE
Redmond, Washington

Project Description

All Wood Recycling (AWR) is located at 504 – 192nd Avenue NE in Redmond, Washington. The site is located within a cluster of light industrial properties along Union Hill Road. AWR recycles wood, concrete, and asphalt materials from regional construction projects. The wood consists of untreated lumber as well as brush and logs. The woody materials are shredded and sold to local industrial boilers as fuel. The asphalt and concrete is crushed and sold to local contractors for use as aggregate for fills. The operations include the use of electrically powered crusher and shredder. Heavy equipment consisting of front end loaders and backhoes are used on-site to move materials from stockpiles to processing areas and then to stock piles. AWR also has dump trucks used to support the site. Most materials are delivered by AWR client owned and operated trucks.

There is a water supply well that is used for domestic water supply on-site. The location of the water supply well is at the east end of the buildings along the southern property line. The well is reported to be about 170 feet deep. No as built of the well is known to exist.

Geologic and Hydrogeologic Characteristics of The Site

The Geologic Map of Redmond prepared by D.B. Booth and J.P. Minard dated 1988 shows the site and vicinity as being underlain by younger Alluvium (Qyal). This deposit is described as being a variety of alluvial sediments deposited by creeks draining the adjacent upland glacial deposits. Borings done on-site by others show that the native stratigraphy consists of sands that extend to about 15 feet below existing grades. The surficial sands are underlain by a soft alluvial silt layer that is about five feet thick. Beneath the silt layer sands extend down to about 27 to 37 feet where a hard glacially consolidated lacustrine silt is present. Logs for these borings are attached in Appendix A.

Test pits on-site have found fill soils that extend up to ten feet below existing grades. The fill soils consist of silty sands. It appears that in the past the site was excavated to remove sand and gravel and that soils from off-site locations were used to restore site grades. The test pits are reported in our report dated August 29, 2011 for the proposed stormwater management pond.

The drinking water well at the east end of the site is reported to be about 170 feet deep. This places the screen in the deeper pre Vashon aquifer, not in the shallow alluvial aquifer.

Groundwater Depth, Flow Direction, and Gradient

Based on existing data, the depth to groundwater is about ten feet below existing grades on-site. At Olympian Precast, the King County database shows the groundwater as being as high as five feet below existing grades. The gradient in the area has been mapped by others to be towards the west-southwest with a gradient of about 0.005 feet per foot. The groundwater mapping by GeoEngineers places the groundwater elevations about Elev. 52. The GeoEngineers data summarizes the range of annual variation groundwater depths as being 2.1 feet. The general site elevation is about Elev. 60 along the west side of the site and Elev. 64 along the east side of the site.

Mr. Kevin Murphy provided us with tabulated groundwater depth data for 2003 and 2005 from Olympian Precast. The depth to static water levels is reported as being about 10.5 to 12 feet below existing grades. The elevations appear to refer to a different datum relative to the datum used for all other groundwater reporting. The ground elevation at Olympian Precast is about Elev. 60.

Wells and Springs within 1,300 Feet

No known springs are within 1,300 feet of the site. No known public water supply wells are within 1,300 feet of the site. There is a private water supply well on site at the east end of the row of buildings along the southern property line. No as built of the well is known to exist. The depth of the well is not known but the estimated depth is about 170 feet. The well does not have a sounding tube to allow static water depths to be measured.

We reviewed data at King County https://fortress.wa.gov/dnr/geology/?Site=subsurf, The Washington State Department of Natural Resources, https://fortress.wa.gov/dnr/geology/?Site=subsurf, and the Washington State Department of Ecology https://fortress.wa.gov/dnr/geology/?Site=subsurf. None of the wells that are mapped as being within 1,300 feet of the site are identified as drinking water wells.

Mr. Kevin Murphy of the City of Redmond provided us with summary memos for groundwater monitoring of the City of Redmond monitoring well system. We received copies or tabulated data from the following memos prepared by Geo Engineers for the City of Redmond:

Year and Season	Date
Autumn and Winter 2007/2008	April 18, 2008
Summer 2008	Tables only
Winter 2009	Tables only
Winter 2010	December 16, 2010
Summer 2010	December 22, 2010
Winter 2011	Tables only

The mapped monitoring wells on maps obtained from the City of Redmond are summarized below:

Well ID	Owner	Approximate Location Relative to site	Groundwater Data
MW-25	City of Redmond	1,300 feet west and downgradient.	February 2011, July 2008, January 2009, July 2009.

Well ID	Owner	Approximate Location Relative to site	Groundwater Data
MW-56 to MW-59	City of Redmond	600 feet southeast and upgradient.	Data shows no sampling from these wells.
RPW-1, RPW-2, RPW-3	Olympian Precast	200 feet west and downgradient.	Limited data from WDOE industrial permit monitoring web site and King County Groundwater Database.
MW-1, MW-2, MW-3, MW-4	Olympian Precast(?)	Approximately 800 feet southwest and downgradient.	No available groundwater measurements of data.
Cadman	Cadman	900 and greater feet southwest and downgradient of the site.	Monitoring wells are listed in the WDOE database but no locations are shown. No available groundwater data. These wells are not shown on the City of Redmond maps.

The results of groundwater testing summarized above for MW-25 shows periodic low pH values in the range of 6.0 and occasional hits of manganese and iron slightly elevated relative to drinking water MCLs. The available results of the Olympian Precast wells are attached in Appendix B.

Critical Areas and Surface Waters

Evans Creek extends through the site. In addition, the site is within the wellhead protection zone for the City of Redmond Well No. 5.

Historical Water Quality Data

The King County hydrogeologic database contained water quality information for a well at Olympian Precast. This water data is within Appendix B. This includes a copy of the iMAP page that shows the location of the well. The historic water quality from City of Redmond monitoring wells is discussed in the memos prepared by GeoEngineers referenced earlier in this memo.

Best Management Plans

BMPs for the facility are attached in Appendix C. These BMPs are standard Ecology developed BMPs.

Historic Water Quality Data for AWR

No monitoring wells have been constructed at AWR. Groundwater samples were collected in the summer for 2011 from two Direct Push Technology temporary well points on the AWR site. The analytical testing of the samples is summarized in a report prepared by Terra Associates entitled *Environmental Sampling – Stormwater Storage Vault Area* dated July 18, 2011. None of the samples had levels of constituents above regulated levels. The drinking water well on-site is not sampled and hence no historic water quality data is available.

Groundwater Monitoring Plan Provisions

Based on existing water quality data from the AWR site and the adjacent Olympian Precast site, no monitoring wells are proposed for the site at this time. If future releases occur that potentially impact groundwater, a site specific groundwater monitoring plan will be created.

Effects of the Proposed Project on Groundwater

The proposed project is an update to the existing infiltration system for management of on-site stormwater runoff. No net increase or decrease of groundwater recharge is expected to occur as a result of the project.

The proposed project incorporated BMPs for stormwater management from the 2005 Ecology Manual. This together with the BMPs is included in Appendix C. Releases that could impact groundwater are anticipated to be limited to fuels and lubricants. The stormwater system will be provided with an oil water separator prior to release to the stormwater management pond. A release of hydrocarbons to the surface west of the creek would be directed to the vault where it could be contained prior to entering the stormwater infiltration facility. All of the ground surface west of the creek is covered with pavement.

Releases of hydrocarbons to the ground surface east of the creek would encounter the silty low permeability fill soils. These soils would slow the transport of hydrocarbons to the water table and allow a timely cleanup of the impacted soils.

If a release of hydrocarbons encountered the groundwater, the materials would flow towards the west-southwest.

Identification of The Type and Quantities of Hazardous Materials On-site

The potentially hazardous materials on-site are diesel for fueling on-site equipment, lubricants for site equipment, hydraulic oil, and engine fluids such as antifreeze. Temporary storage for used lubricants and antifreeze will also be on-site. Diesel will be stored in a fixed fueling facility that meets City of Redmond requirements. Engine oil, hydraulic oil, and antifreeze are stored on-site in factory supplied containers in a covered storage area. Used engine fluids are stored in 55-gallon drums in a covered storage area.

Hazardous Materials Storage

The engine fluids, both new and used together with hydraulic oil will be stored in covered storage areas. Purchases of new materials will be limited to supplies commonly consumed within a three month period. Used oil will be picked up as the 55-gallon drum is filled.

Diesel fuel will be stored in a fixed fuel facility. The fueling system will be monitored on at least a daily basis and every time it is used. Any release will be promptly cleaned up and the source of the release will be repaired.

Plan Implementation During Construction

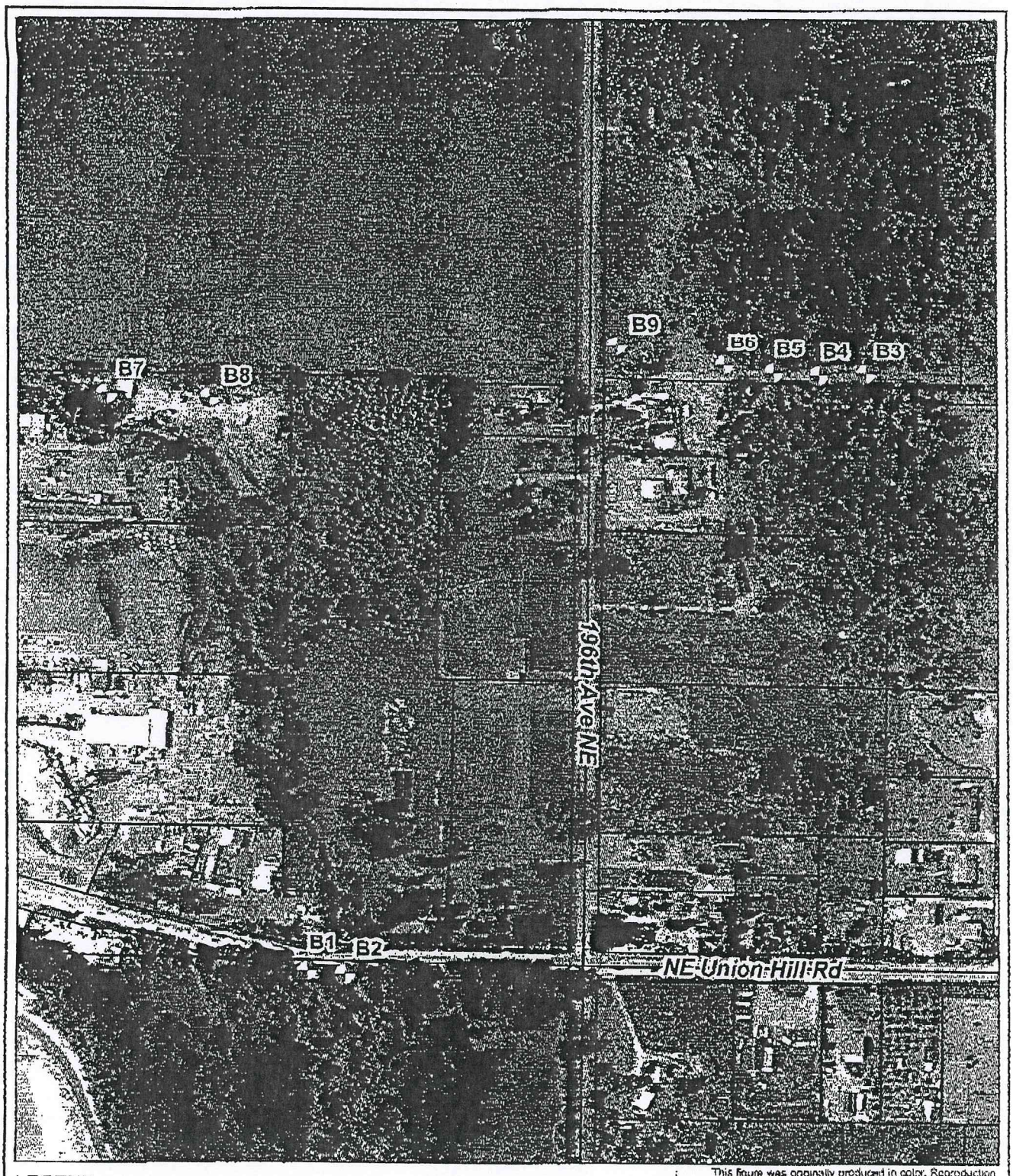
During construction, the BMPs contained in Appendix C and the spill plan contained in Appendix D will be implemented.

Spill Plan

A spill plan is attached in Appendix D.

APPENDIX A

BORING LOGS BY OTHERS



LEGEND

Boring Location

Parcel Boundary

0 1300

Scale in Feet

Map Projection:
Washington State Plane,
North Zone, NAD 83, Feet
Source: USGS

This figure was originally produced in color. Reproduction in black and white may result in a loss of information.

N

FIGURE 2

BORING LOCATION MAP

PSE/EVANS CREEK CROSSING 16" GAS/WA

0631168F02.mxd ; MOD, 10/12/2006 ; TGB

Golder Associates

Unified Soil Classification System

Criteria for Assigning Group Symbols and Names			Soil Classification Generalized Group Descriptions	
COARSE-GRAINED SOILS More than 50% retained on No. 200 sieve	GRAVELS More than 50% of coarse fraction retained on No. 4 Sieve	CLEAN GRAVELS Less than 5% fines	GW	Well-graded Gravels
			GP	Poorly-graded gravels
		GRAVELS WITH FINES More than 12% fines	GM	Gravel and Silt Mixtures
			GC	Gravel and Clay Mixtures
	SANDS 50% or more of coarse fraction passes No. 4 Sieve	CLEAN SANDS Less than 5% fines	SW	Well-graded Sands
			SP	Poorly-graded Sands
		SANDS WITH FINES More than 12% fines	SM	Sand and Silt Mixtures
			SC	Sand and Clay Mixtures
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve	SILTS AND CLAYS Liquid limit less than 50	INORGANIC	CL	Low-plasticity Clays
			ML	Non-plastic and Low-Plasticity Silts
		ORGANIC	OL	Non-plastic and Low-Plasticity Organic Clays Non-plastic and Low-Plasticity Organic Silts
	SILTS AND CLAYS Liquid limit greater than 50	INORGANIC	CH	High-plasticity Clays
			MH	High-plasticity Silts
		ORGANIC	OH	High-plasticity Organic Clays High-plasticity Organic Silts
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT	Peat

Component Definitions by Gradation

Component	Size Range
Boulders	Above 12 in.
Cobbles	3 in. to 12 in.
Gravel	3 in. to No. 4 (4.76mm)
Coarse gravel	3 in. to 3/4 in.
Fine gravel	3/4 in. to No. 4 (4.76mm)
Sand	No. 4 (4.76mm) to No. 200 (0.074mm)
Coarse sand	No. 4 (4.76mm) to No. 10 (2.0mm)
Medium sand	No. 10 (2.0mm) to No. 40 (0.42mm)
Fine sand	No. 40 (0.42mm) to No. 200 (0.074mm)
Silt and Clay	Smaller than No. 200 (0.074mm)

Samples

SS	SPT Sampler (2.0" OD)
HD	Heavy Duty Split Spoon
ST	Shelby Tube
P	Piston Sampler
B	Bulk
C	Cored

Unless otherwise noted, drive samples advanced with 140 lb. hammer with 30 in. drop.

Relative Density or Consistency Utilizing Standard Penetration Test Values

Cohesionless Soils (a)			Cohesive Soils (b)		
Density (c)	N, blows/ft. (c)	Relative Density (%)	Consistency	N, blows/ft. (c)	Undrained Shear Strength (d) (psf)
Very loose	0 to 4	0 – 15	Very soft	0 to 2	<250
Loose	4 to 10	15 – 35	Soft	2 to 4	250–500
Compact	10 to 30	35 – 65	Firm	4 to 8	500–1000
Dense	30 to 50	65 – 85	Stiff	8 to 15	1000–2000
Very Dense	over 50	>85	Very Stiff	15 to 30	2000–4000
			Hard	over 30	>4000

(a) Soils consisting of gravel, sand, and silt, either separately or in combination, possessing no characteristics of plasticity, and exhibiting drained behavior.

(b) Soils possessing the characteristics of plasticity, and exhibiting undrained behavior.

(c) Refer to text of ASTM D 1586-84 for a definition of N; in normally consolidated cohesionless soils Relative Density terms are based on N values corrected for overburden pressure.

(d) Undrained shear strength = 1/2 unconfined compression strength.

Laboratory Tests

Test	Designation
Moisture	(1)
Density	D
Grain Size	G
Hydrometer	H
Atterberg Limits	(1)
Consolidation	C
Unconfined	U
UU Triax	UU
CU Triax	CU
CD Triax	CD
Permeability	P

(1) Moisture and Atterberg Limits plotted on log.

Descriptive Terminology Denoting Component Proportions

Descriptive Terms	Range of Proportion
Trace	0–5%
Little	5–12%
Some or Adjective (a)	12–30%
And	30–50%

(a) Use Gravelly, Sandy or Silty as appropriate.

Silt and Clay Descriptions

Description	Typical Unified Designation
Silt	ML (non-plastic)
Clayey Silt	CL-ML (low plasticity)
Silty Clay	CL
Clay	CH
Plastic Silt	MH
Organic Soils	OL, OH, Pt

Golder Associates

Figure

SOIL CLASSIFICATION/LEGEND

RECORD OF BOREHOLE B7

SHEET 1 of 2

PROJECT: Evans Creek 192nd St
PROJECT NUMBER: 063-1188
LOCATION: AWR Recycling Yard West
DRILLING METHOD: Hollow Stem Auger
DRILLING DATE: 8/02/2006
DRILL RIG: Mobile B-61
DATUM: MSL
AZIMUTH: N/A
COORDINATES: not surveyed
ELEVATION:
INCLINATION: -90

DEPTH (ft)	BORING METHOD	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	NOTES WATER LEVELS
0	Hollow Stem Auger	0.0 - 15.3 Compact, dark-brown, non-stratified silty fine to coarse SAND, little fine rounded gravel, trace organics (charcoal), trace fine rounded cobbles, damp, (SM), (FILL).	SM								Drilling smooth
5						1	SPT	8-5-21	26	1.2 / 1.5	
											Coarse gravel, fine cobbles in cuttings
10		Loose, dark grey-brown, non-stratified fine silty SAND, damp, (SM) (FILL).				2	SPT	1	1	0.1 / 1.5	
15		Loose, dark-grey, non-stratified fine sand lense (3")			15.3	3	SPT	1	1	1.5 / 1.5	
		15.3 - 23.0 Loose, dark-gray, non-stratified, massive SILT with little fine sand, trace organics, damp (SM-ML) (ALLUVIUM).	ML								
20		Firm, medium-gray, non-stratified, massive SILT, little fine sand, trace clay, damp (ML) (ALLUVIUM).				4	SPT	1-1-4	5	1.5 / 1.5	
		23.0 - 37.5			23.0						
25		Dense, dark-gray, nonstratified, massive fine to coarse SAND, trace fine rounded gravel, trace silt, damp (SP) (Transition Beds).				5	SPT	1-7-25	32	1.5 / 1.5	
30		Very dense, light to dark-gray/ olive-gray, nonstratified, fine to coarse SAND, trace silt, with silt lense from 30 to 30.3 feet, damp (SP) (Transition Beds).	SP			6	SPT	71	71	0.5 / 0.5	
35		Very dense, light to dark-gray, non-stratified, fine to coarse SAND, little fine rounded gravel, trace silt, damp (SP) (Transition Beds).				7	SPT	50	50	0.5 / 0.5	Water added to boring to make drilling easier
		37.5 - 71.5	ML		37.5						
40		Log continued on next page									

PENETRATION RESISTANCE BLOWS / ft (10, 20, 30, 40)
WATER CONTENT (PERCENT) W_p — W — W_l

1 in to 5 ft
DRILLING CONTRACTOR: Cascade
DRILLER: James
LOGGED: A. Gillespie
CHECKED:
DATE:

Golder Associates

BOREHOLE RECORD EVANSCREEKTHREE.GPJ GLDR_WA.GDT 1/16/07

RECORD OF BOREHOLE B7

SHEET 2 of 2

PROJECT: Evans Creek 192nd St
PROJECT NUMBER: 063-1188
LOCATION: AWR Recycling Yard West
DRILLING METHOD: Hollow Stem Auger
DRILLING DATE: 8/02/2006
DRILL RIG: Mobile B-61
DATUM: MSL
AZIMUTH: N/A
COORDINATES: not surveyed
ELEVATION:
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft (10 20 30 40) / WATER CONTENT (PERCENT) W_p W W_l	NOTES WATER LEVELS
40	Hollow Stem Auger	37.5 - 71.5 *(Continued)*										
		Hard, light to dark-gray, non-stratified, massive SILT, trace fine micaceous sand (2" lense of fine rounded gravel from 41.2-41.5"), damp, (ML) (Transition Beds).				8	SPT	22-35-42	>50	1.5/1.5		Drilling smooth again
45		Hard, light to dark-gray, non-stratified, massive SILT, trace fine micaceous sand, damp, (ML) (Transition Beds).				9	SPT	30-41-44	>50	1.5/1.5		
50		Hard, light-gray, non-stratified, massive SILT, trace fine sand, damp, (ML) (Transition Beds).				10	SPT	20-22-42	>50	1.5/1.5		
55		Hard, light-gray, non-stratified, massive SILT, trace clay, trace very fine sand, damp, (ML) (Transition Beds).	ML			11	SPT	32-36-36	>50	1.5/1.5		
60		Hard, medium-gray, non-stratified, massive SILT, trace clay, trace very fine micaceous sand, damp (ML) (Transition Beds).				12	SPT	20-32-36	>50	1.5/1.5		
65		Hard, medium-gray, non-stratified, massive SILT, trace clay, damp, (ML) (Transition Beds).				13	SPT	16-32-32	>50	1.5/1.5		
70		Hard, medium-gray, non-stratified, massive SILT, trace clay, damp (ML) (Transition Beds).				14	SPT	30-44-54	>50	1.5/1.5		Hole completed at 71.5 feet, backfilled with bentonite chips.
		Boring completed at 71.5 ft.			71.5							
75												
80												

1 in to 5 ft
DRILLING CONTRACTOR: Cascade
DRILLER: James
LOGGED: A. Gillespie
CHECKED:
DATE:

Golder Associates

BOREHOLE RECORD EVANSCREEKTHREE.GPJ GLDR_WA.GDT 1/19/07

RECORD OF BOREHOLE B8

SHEET 1 of 2

PROJECT: Evans Creek 192nd St
PROJECT NUMBER: 063-1188
LOCATION: AWR Recycling Yard East

DRILLING METHOD: Hollow Stem Auger
DRILLING DATE: 8/02/2006
DRILL RIG: Mobile B-61 with Autohammer

DATUM: MSL
AZIMUTH: N/A
COORDINATES: not surveyed

ELEVATION:
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft (10 20 30 40) / WATER CONTENT (PERCENT) w_p w w_l	NOTES WATER LEVELS
0	Hollow Stem Auger	0.0 - 12.5										
5		Loose, light-gray to olive-gray, non-stratified fine to coarse SAND, trace rounded fine gravel, trace silt, damp (SP) (ALLUVIUM)	SP			1	SPT	4-3-2	5	0.8 / 1.5		
10		Compact, light-brown to light-tan, non-stratified, fine to coarse SAND, little fine to medium rounded gravel, little silt, little clay, strong smell, damp (SP) (ALLUVIUM)				2	SPT	5-7-8	15	1.5 / 1.5		
		12.5 - 17.5			12.5							
15		Very soft, dark-brown, non-stratified fine SILT with organics (grasses, bark), little fine light-gray sand lenses (1/2"), damp, (ML) (ALLUVIUM).	ML			3	SPT	1-1-1	2	1.5 / 1.5		
		17.5 - 32.5			17.5							
20		Very loose, light-gray to light-brown, non-stratified fine to medium SAND, little silt, trace fine rounded gravel, trace organics, wet, (SM) (ALLUVIUM).				4	SPT	1-0-0	0	1.5 / 1.5		
25		Compact, light- to olive-gray, non-stratified, fine to coarse sub-rounded SAND, trace silt, wet (SP) (ALLUVIUM)	SP			5	SPT	6-5-6	11	1.0 / 1.5		
30		Very dense, light to olive-gray, non-stratified fine to coarse SAND, trace silt, trace sub-rounded fine gravel, damp (SP) (Transition Beds).				6	SPT	20-32-50	>50	1.5 / 1.5		
		32.5 - 37.5			32.5							
35		Very dense, light to dark-gray, non-stratified, massive medium to coarse SAND (top 6") grading to fine silty micaceous SAND (bottom 10"), damp (SM) (Transition Beds).	SM			7	SPT	16-26-25	>50	1.5 / 1.5		
		37.5 - 71.5			37.5							
40		Log continued on next page	ML									

1 in to 5 ft
DRILLING CONTRACTOR: Cascade
DRILLER: James

LOGGED: A. Gillespie
CHECKED:
DATE:

Golder Associates

BOREHOLE RECORD EVANSCREEKTHREE.GPJ GLDR_WA.GDT 1/18/07

RECORD OF BOREHOLE B8

PROJECT: Evans Creek 192nd St
PROJECT NUMBER: 063-1189
LOCATION: AWR Recycling Yard East
DRILLING METHOD: Hollow Stem Auger
DRILLING DATE: 8/02/2006
DRILL RIG: Mobile B-61 with Autohammer
DATUM: MSL
AZIMUTH: N/A
COORDINATES: not surveyed
SHEET 2 of 2
ELEVATION:
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft (10 20 30 40) WATER CONTENT (PERCENT) W_p W W_l	NOTES WATER LEVELS
40	Hollow Stem Auger	37.5 - 71.5 *(Continued)*										
		Hard, medium-gray, non-stratified massive SILT, trace clay, trace very fine micaceous sand, wet, (ML) (Transition Beds)				8	SPT	12-20-24	44	1.5/1.5		
45		Hard, medium-gray, non-stratified, massive SILT, trace clay, wet (ML) (Transition Beds)				9	SPT	79	79	0.5/0.5		
50		Hard, medium-gray, non-stratified massive SILT, trace clay, trace fine to medium sand lense (1/2"), damp (ML) (Transition Beds).				10	SPT	14-18-26	44	1.5/1.5		
55		Hard, medium-gray, non-stratified massive SILT, trace clay, trace very fine micaceous sand, damp, (ML) (Transition Beds).	ML			11	SPT	22-77-1	>50	1.5/1.5		
60		Hard, medium-gray, non-stratified massive SILT, trace clay, damp (ML) (Transition Beds).				12	SPT	11-32-20	>50	1.5/1.5		
65		Hard, medium-gray, non-stratified massive SILT, trace clay, damp (ML) (Transition Beds)				13	SPT	74	74	0.5/0.5		
70		Hard, medium-gray, non-stratified massive SILT, trace clay, damp (ML) (Transition Beds).				14	SPT	44-32-47	>50	1.5/1.5		Boring completed at 71.5 feet and backfilled with bentonite chips.
		Boring completed at 71.5 ft.			71.5							
75												
80												

1 in to 5 ft
DRILLING CONTRACTOR: Cascade
DRILLER: James
LOGGED: A. Gillespie
CHECKED:
DATE:

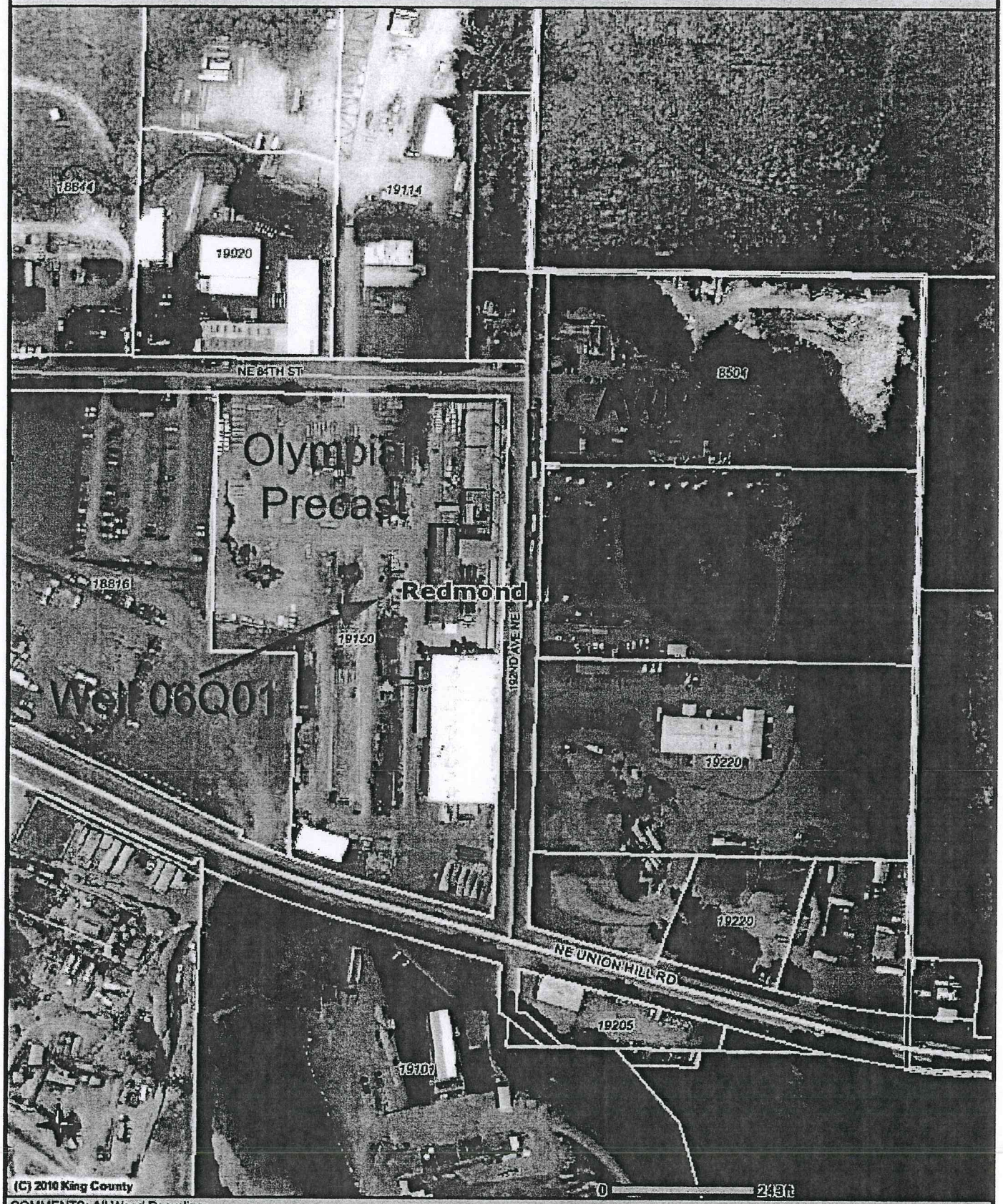
Golder Associates

BOREHOLE RECORD EVANSCREEKTHREE.GPJ GLDR_WA.GDT 1/18/07

APPENDIX B

OLYMPIC PRECAST GROUNDWATER DATA

Olympian Precast Monitoring Well Location



COMMENTS: All Wood Recycling
Redmond Washington

Date: 8/29/2011 Source: King County iMAP - Groundwater Program (http://www.metrokc.gov/GIS/iMAP)

King County

King County Groundwater Data: 8/28/2011

If you have any questions about this data, please contact Eric Ferguson at 206-263-6512 or email eric.ferguson@kingcounty.gov .

Well Detail

Well ID	R_474037122050201
Location Name	OLYMPIAN PRECAST
Well Type	Well
Well Depth (ft)	128
Has Water Level	Yes
Has Water Quali	Yes
Local Number	25N/06E-06Q01
Ecology Well Ta	Unknown
Parcel Number	
GWMA Code	Redmond-Bear Creek Valley
Basin	Evans Creek
CARA Area	None
City	Redmond

Water Level Data

Well ID	Measurement Da	Measurement Tim	ter Level Depth	Well Depth (ft)	Measure Method
R_47403712205	12/10/2001	10:00	4.4	128	Calibrated electric tape
R_47403712205	12/20/1991	23:59	5.36	128	Reported
R_47403712205	11/20/1991	23:59	5.12	128	Reported
R_47403712205	10/16/1991	23:59	5.06	128	Reported
R_47403712205	09/20/1991	23:59	5.03	128	Reported
R_47403712205	08/16/1991	23:59	5	128	Reported
R_47403712205	07/23/1991	23:59	5.12	128	Electric tape
R_47403712205	06/18/1991	23:59	3.9	128	Electric tape
R_47403712205	05/15/1991	23:59	3.5	128	Electric tape
R_47403712205	05/17/1990	23:59	3.8	128	Electric tape
R_47403712205	04/18/1990	23:59	3.8	128	Electric tape
R_47403712205	03/13/1990	23:59	2.97	128	Electric tape
R_47403712205	02/09/1990	23:59	5.65	128	Electric tape
R_47403712205	01/17/1990	23:59	4.2	128	Electric tape
R_47403712205	11/17/1989	23:59	3.24	128	Electric tape
R_47403712205	10/20/1989	23:59	5.12	128	Electric tape
R_47403712205	09/21/1989	23:59	5.25	128	Electric tape
R_47403712205	08/15/1989	23:59	4.23	128	Electric tape
R_47403712205	07/18/1989	23:59	4.22	128	Electric tape
R_47403712205	06/16/1989	23:59	4.27	128	Electric tape
R_47403712205	05/15/1989	23:59	3.71	128	Electric tape

Water Quality Data

Well ID	Sample Date	Sample Time	Sample Type	Analyte Name	Analyte Type	Detected	Result Value	Unit	Qualifier	Task Code
R_47403712205	10/07/2002	11:30	Normal Environ	Alkalinity, Total	Conventals	Yes	101	mg/l		RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environ	Ammonia-N	Conventals	Yes	0.175	mg/l		RED_Round4

R_47403712205	10/07/2002	11:30	Normal Environi	Chloride	Conventals	Yes	2.42	mg/l		RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Fluoride	Conventals	Yes	0.0844	mg/l		RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Nitrate + Nitrite	Conventals	No	0.02	mg/l	<MDL	RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Phosphate, total	Conventals	Yes	0.292	mg/l		RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Silica	Conventals	Yes	26	mg/l		RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Sulfate	Conventals	Yes	0.988	mg/l		RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Total Dissoved S	Conventals	Yes	130	mg/l		RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Dissolved Oxyge	Field parameters	Yes	3.14	mg/l		RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	pH, Field	Field parameters	Yes	7.93	pH units		RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Conductivity, Fi	Field parameters	Yes	126.3	uS/cm		RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Temperature	Field parameters	Yes	10.7	deg c		RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Turbidity, Field	Field parameters	Yes	0.37	NTU		RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Antimony	Metals	No	0.0005	mg/l	<MDL	RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Arsenic	Metals	Yes	0.00468	mg/l		RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Barium	Metals	Yes	0.00736	mg/l		RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Beryllium	Metals	No	0.0002	mg/l	<MDL	RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Cadmium	Metals	No	0.0001	mg/l	<MDL	RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Calcium	Metals	Yes	14.3	mg/l		RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Chromium	Metals	No	0.0004	mg/l	<MDL	RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Cobalt	Metals	No	0.0002	mg/l	<MDL	RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Copper	Metals	No	0.0004	mg/l	<MDL	RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Iron	Metals	No	0.05	mg/l	<MDL	RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Lead	Metals	No	0.0002	mg/l	<MDL	RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Magnesium	Metals	Yes	3.78	mg/l		RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Manganese	Metals	Yes	0.0468	mg/l		RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Mercury	Metals	No	0.0002	mg/l	<MDL	RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Nickel	Metals	Yes	0.00043	mg/l	<RDL	RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Potassium	Metals	Yes	2.6	mg/l	<RDL	RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Selenium	Metals	No	0.0015	mg/l	<MDL	RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Silver	Metals	No	0.0002	mg/l	<MDL	RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Sodium	Metals	Yes	24	mg/l		RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Thallium	Metals	No	0.0002	mg/l	<MDL	RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Vanadium	Metals	No	0.0003	mg/l	<MDL	RED_Round4
R_47403712205	10/07/2002	11:30	Normal Environi	Zinc	Metals	Yes	0.015	mg/l		RED_Round4
R_47403712205	06/04/2002	10:30	Normal Environi	Alkalinity, Total	Conventals	Yes	99.5	mg/l		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Chloride	Conventals	Yes	2.26	mg/l		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Fluoride	Conventals	Yes	0.03	mg/l		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Nitrate + Nitrite	Conventals	No	0.02	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Phosphate, total	Conventals	Yes	0.278	mg/l		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Silica	Conventals	Yes	30	mg/l		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Sulfate	Conventals	Yes	0.985	mg/l		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Total Dissoved S	Conventals	Yes	143	mg/l		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Basudin, Neocid	Endocrine Disru	No	0.00013	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	1,2,4-Trichlorob	Endocrine Disru	No	0.0000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	1,2-Benzphenant	Endocrine Disru	No	0.000013	mg/l	<MDL	RED_Round3

R_47403712205	06/04/2002	10:30	Normal Environ	1,2-Dichloroben	Endocrine Disru	No	0.0000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	1,4-Dichloroben	Endocrine Disru	No	0.0000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	2,4,5-Trichlorop	Endocrine Disru	No	0.000065	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	2,4,6-Trichlorop	Endocrine Disru	No	0.000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	2,4-Dichlorophe	Endocrine Disru	No	0.000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	2,4-Dimethylphe	Endocrine Disru	No	0.000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	2,4-Dinitrophenc	Endocrine Disru	No	0.00052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	2,4-Dinitrotoluer	Endocrine Disru	No	0.00013	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	2,6-Dinitrotoluer	Endocrine Disru	No	0.000065	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	2-Chloronaphtha	Endocrine Disru	No	0.0000052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	2-Chlorophenol	Endocrine Disru	No	0.000013	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	2-Methylnaphtha	Endocrine Disru	No	0.0000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	2-Methylphenol	Endocrine Disru	No	0.000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	2-Nitroaniline	Endocrine Disru	No	0.000065	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	2-Nitrophenol	Endocrine Disru	No	0.000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	3,3'-Dichloroben	Endocrine Disru	No	0.000065	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	3,5,5-Trimethyl-	Endocrine Disru	No	0.000065	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	3-Methylphenol	Endocrine Disru	No	0.000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	3-Nitroaniline	Endocrine Disru	No	0.000065	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	4,6-Dinitro-2-M	Endocrine Disru	No	0.00052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	4-Bromophenyl	Endocrine Disru	No	0.000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	4-Chloro-3-Meth	Endocrine Disru	No	0.000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	4-Chlorophenyl	Endocrine Disru	No	0.0000052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	4-Methylphenol	Endocrine Disru	No	0.000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	4-Nitrophenol	Endocrine Disru	No	0.00052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Acenaphthene	Endocrine Disru	No	0.0000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Acenaphthylene	Endocrine Disru	No	0.0000052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Aniline	Endocrine Disru	No	0.000065	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Anthracene	Endocrine Disru	No	0.0000052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Atrazine	Endocrine Disru	No	0.00013	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Benzo(A)Anthra	Endocrine Disru	No	0.000013	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Benzo(A)Pyrene	Endocrine Disru	No	0.0000052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Benzo(B)Fluorar	Endocrine Disru	No	0.0000052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Benzo(G,H,I)Per	Endocrine Disru	No	0.0000052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Benzo(K)Fluorar	Endocrine Disru	No	0.0000052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Benzoic Acid	Endocrine Disru	No	0.00052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Benzyl Alcohol	Endocrine Disru	No	0.000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Benzyl Butyl Ph	Endocrine Disru	Yes	0.000185	mg/l	B	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Bis(2-Chloroeth	Endocrine Disru	No	0.000013	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Bis(2-Chloroethy	Endocrine Disru	No	0.0000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Bis(2-Ethylhexyl	Endocrine Disru	Yes	0.00134	mg/l	B	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Caffeine	Endocrine Disru	No	0.000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Carbazole	Endocrine Disru	No	0.000013	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Dibenz(A,H)Ant	Endocrine Disru	No	0.000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Dibenzofuran	Endocrine Disru	No	0.0000026	mg/l	<MDL	RED_Round3

R_47403712205	06/04/2002	10:30	Normal Environ	Diethyl Phthalate	Endocrine Disru	No	0.000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Dimethyl Phthal	Endocrine Disru	No	0.000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Di-N-Butylphtha	Endocrine Disru	Yes	0.00012	mg/l	<RDL,B	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Di-N-Octylphtha	Endocrine Disru	No	0.000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Fluoranthene	Endocrine Disru	No	0.0000052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Fluorene	Endocrine Disru	No	0.0000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Hexachloro-1,3-	Endocrine Disru	No	0.0000052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Hexachlorobenze	Endocrine Disru	No	0.0000052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Hexachlorocyclo	Endocrine Disru	No	0.000065	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Hexachloroethan	Endocrine Disru	No	0.000013	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Indeno(1,2,3-Cd	Endocrine Disru	No	0.000013	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	M-Dichlorobenz	Endocrine Disru	No	0.0000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Methanamine, N	Endocrine Disru	No	0.000013	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Naphthalene	Endocrine Disru	No	0.0000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Nitrobenzene	Endocrine Disru	No	0.0000052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	N-Nitroso-Di-N-	Endocrine Disru	No	0.000013	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	N-Nitrosodiphen	Endocrine Disru	No	0.000013	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	P-Chloroaniline	Endocrine Disru	No	0.000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Pentachlorophen	Endocrine Disru	No	0.00052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Phenanthrene	Endocrine Disru	No	0.0000052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Phenol	Endocrine Disru	No	0.000013	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	P-Nitroaniline	Endocrine Disru	No	0.00013	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Pyrene	Endocrine Disru	No	0.0000052	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Pyridine	Endocrine Disru	No	0.000065	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Simazine	Endocrine Disru	No	0.00013	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Dissolved Oxyge	Field parameters	Yes	3.29	mg/l		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	pH, Field	Field parameters	Yes	7.85	pH units		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Conductivity, Fi	Field parameters	Yes	201	uS/cm		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Temperature	Field parameters	Yes	12.2	deg c		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Turbidity, Field	Field parameters	Yes	0.66	NTU		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Antimony	Metals	No	0.0005	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Arsenic	Metals	Yes	0.00501	mg/l		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Barium	Metals	Yes	0.00815	mg/l		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Beryllium	Metals	No	0.0002	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Cadmium	Metals	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Calcium	Metals	Yes	14.6	mg/l		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Chromium	Metals	No	0.0004	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Cobalt	Metals	No	0.0002	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Copper	Metals	Yes	0.00049	mg/l	<RDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Cyanide	Metals	No	0.005	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Iron	Metals	Yes	0.07	mg/l	<RDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Lead	Metals	No	0.0002	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Magnesium	Metals	Yes	3.87	mg/l		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Manganese	Metals	Yes	0.0515	mg/l		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Mercury	Metals	No	0.0002	mg/l	<MDL	RED_Round3

R_47403712205	06/04/2002	10:30	Normal Environi	Molybdenum	Metals	Yes	0.0016	mg/l	<RDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Nickel	Metals	Yes	0.00037	mg/l	<RDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Potassium	Metals	Yes	2.2	mg/l	<RDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Selenium	Metals	No	0.0015	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Silver	Metals	No	0.0002	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Sodium	Metals	Yes	24.5	mg/l		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Thallium	Metals	No	0.0002	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Vanadium	Metals	No	0.0003	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Zinc	Metals	Yes	0.0263	mg/l		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Coliforms, Fecal	Microbiology	No	0	CFU/100ml		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Coliforms, Total	Microbiology	No	0	CFU/100ml		RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	2,2-Dichlor0prop	Organics	No	0.0000073	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	2,2'-Oxybis(1-Cl	Organics	No	0.0000026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	2,4,5-T	Organics	No	0.000033	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	2,4,5-Tp (Silvex)	Organics	No	0.000013	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	2,4-D	Organics	No	0.000018	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	2,4-DB	Organics	No	0.000034	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Azobenzene	Organics	No	0.000013	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Coprostanol	Endocrine Disru	No	0.00026	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Dicamba	Organics	No	0.000013	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Dichlorprop	Organics	No	0.0000067	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Dinitrobutyl Phe	Organics	No	0.000017	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	MCPA (2-Methy	Organics	No	0.0000067	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	MCPP	Organics	No	0.0000079	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	1,1,1-Trichloroet	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	1,1,2,2-Tetrachlo	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	1,1,2-Trichloroet	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	1,1-Dichloroetha	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	1,1-Dichloroethy	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	1,2-Dichloroetha	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	1,2-Dichloropro	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	2-Butanone	Volatile Organic	No	0.0005	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	4-Methyl-2-Pent	Volatile Organic	No	0.0005	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Acetone	Volatile Organic	No	0.00025	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Acrylonitrile	Volatile Organic	No	0.0005	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Benzene	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Bromodichlorom	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Bromomethane	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Carbon Disulfid	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Carbon Tetrachl	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Cfc-11	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Chlorobenzene	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Chlorodibromom	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Chloroethane	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environi	Chloroform	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3

R_47403712205	06/04/2002	10:30	Normal Environ	Chloromethane	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Cis-1,3-Dichloro	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Dichloromethane	Volatile Organic	No	0.00025	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Ethylbenzene	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Styrene (Monom	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Tetrachloroethen	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Toluene	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Trans-1,2-Dichlo	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Trans-1,3-Dichlo	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Tribomomethane	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Trichloroethylen	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Vinyl Acetate	Volatile Organic	No	0.0005	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Vinyl Chloride	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	06/04/2002	10:30	Normal Environ	Xylene (Total)	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round3
R_47403712205	12/10/2001	12:20	Normal Environ	Alkalinity, Total	Conventals	Yes	98.1	mg/l		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Chloride	Conventals	Yes	2.45	mg/l		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Fluoride	Conventals	Yes	0.09	mg/l		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Hardness	Conventals	Yes	52.6	mg/l		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Nitrate-N	Conventals	No	0.02	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Nitrite-N	Conventals	No	0.02	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Silica	Conventals	Yes	32	mg/l		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Sulfate	Conventals	Yes	1.38	mg/l		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Total Dissoved S	Conventals	Yes	138	mg/l		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	4-Chlorophenyl I	Endocrine Disru	No	0.0005	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Dissolved Oxyge	Field parameters	Yes	7.44	mg/l		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	pH, Field	Field parameters	Yes	8.06	pH units		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Conductivity, Fi	Field parameters	Yes	206	uS/cm		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Temperature	Field parameters	Yes	10.4	deg c		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Turbidity, Field	Field parameters	Yes	5	NTU		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Antimony	Metals	No	0.0005	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Arsenic	Metals	Yes	0.00505	mg/l		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Barium	Metals	Yes	0.00949	mg/l		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Beryllium	Metals	No	0.0002	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Cadmium	Metals	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Calcium	Metals	Yes	14.8	mg/l		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Chromium	Metals	No	0.0004	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Cobalt	Metals	No	0.0002	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Copper	Metals	Yes	0.00079	mg/l	<RDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Iron	Metals	Yes	0.448	mg/l		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Lead	Metals	Yes	0.00025	mg/l	<RDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Magnesium	Metals	Yes	3.79	mg/l		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Manganese	Metals	Yes	0.0956	mg/l		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Mercury	Metals	No	0.0002	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Molybdenum	Metals	Yes	0.0016	mg/l	<RDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Nickel	Metals	Yes	0.00045	mg/l	<RDL	RED_Round2

R_47403712205	12/10/2001	12:20	Normal Environi	Potassium	Metals	Yes	2.6	mg/l	<RDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Selenium	Metals	No	0.0015	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Silver	Metals	No	0.0002	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Sodium	Metals	Yes	23	mg/l		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Thallium	Metals	No	0.0002	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Zinc	Metals	Yes	0.0798	mg/l		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Coliforms, Fecal	Microbiology	No	0	CFU/100ml		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Coliforms, Total	Microbiology	No	0	CFU/100ml		RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	2,2-Dichlor0prop	Organics	No	0.0000037	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	2,4,5-T	Organics	No	0.000017	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	2,4,5-Tp (Silvex)	Organics	No	0.0000067	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	2,4-D	Organics	No	0.0000087	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	2,4-DB	Organics	No	0.000017	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Dicamba	Organics	No	0.0000065	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Dichlorprop	Organics	No	0.0000033	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Dinitrobutyl Phe	Organics	No	0.0000086	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	MCPA (2-Methy	Organics	No	0.0000033	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	MCPP	Organics	No	0.000004	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	1,1,1-Trichloroet	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	1,1,2,2-Tetrachlo	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	1,1,2-Trichloroet	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	1,1-Dichloroetha	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	1,1-Dichloroethy	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	1,2-Dichloroetha	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	1,2-Dichloropro	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	2-Butanone	Volatile Organic	No	0.0005	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	4-Methyl-2-Pent	Volatile Organic	No	0.0005	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Acetone	Volatile Organic	No	0.00025	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Acrylonitrile	Volatile Organic	No	0.0005	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Benzene	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Bromodichlorom	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Bromomethane	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Carbon Disulfide	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Carbon Tetrachl	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Cfc-11	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Chlorobenzene	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Chlorodibromom	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Chloroethane	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Chloroform	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Chloromethane	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Cis-1,3-Dichloro	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Dichloromethane	Volatile Organic	No	0.00025	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Ethylbenzene	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Styrene (Monom	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environi	Tetrachloroethen	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2

R_47403712205	12/10/2001	12:20	Normal Environ	Toluene	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Trans-1,2-Dichlo	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Trans-1,3-Dichlo	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Tribomomethane	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Trichloroethylen	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Vinyl Acetate	Volatile Organic	No	0.0005	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Vinyl Chloride	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	12/10/2001	12:20	Normal Environ	Xylene (Total)	Volatile Organic	No	0.0001	mg/l	<MDL	RED_Round2
R_47403712205	05/21/2001	14:05	Normal Environ	Alkalinity, Total	Conventals	Yes	102	mg/l		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Alkalinity, Total	Conventals	Yes	101	mg/l		RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environ	Chloride	Conventals	Yes	2.47	mg/l		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Chloride	Conventals	Yes	2.65	mg/l		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Fluoride	Conventals	No	0.02	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environ	Fluoride	Conventals	No	0.02	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environ	Hardness	Conventals	Yes	54.4	mg/l		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Hardness	Conventals	Yes	52.5	mg/l		RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environ	Nitrate-N	Conventals	No	0.02	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Nitrate-N	Conventals	Yes	0.02	mg/l	<RDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environ	Nitrite-N	Conventals	No	0.02	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Nitrite-N	Conventals	No	0.02	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environ	Silica	Conventals	Yes	26	mg/l		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Silica	Conventals	Yes	26	mg/l		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Sulfate	Conventals	Yes	1.52	mg/l		RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environ	Sulfate	Conventals	Yes	1.5	mg/l		RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environ	Total Dissoved S	Conventals	Yes	136	mg/l		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Total Dissoved S	Conventals	Yes	133	mg/l		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Total Organic Ha	Conventals	No	0.01	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environ	Total Organic Ha	Conventals	No	0.01	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Dissolved Oxyge	Field parameters	Yes	1.93	mg/l		RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environ	Dissolved Oxyge	Field parameters	Yes	1.78	mg/l		RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environ	pH, Field	Field parameters	Yes	8.46	pH units		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	pH, Field	Field parameters	Yes	8.32	pH units		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Conductivity, Fi	Field parameters	Yes	192.5	uS/cm		RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environ	Conductivity, Fi	Field parameters	Yes	200	uS/cm		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Temperature	Field parameters	Yes	12.9	deg c		RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environ	Temperature	Field parameters	Yes	12	deg c		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Turbidity, Field	Field parameters	Yes	0.38	NTU		RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environ	Turbidity, Field	Field parameters	Yes	0.5	NTU		RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environ	Antimony	Metals	No	0.0005	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Antimony	Metals	No	0.0005	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Arsenic	Metals	Yes	0.00485	mg/l		RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environ	Arsenic	Metals	Yes	0.00484	mg/l		RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environ	Barium	Metals	Yes	0.00808	mg/l		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Barium	Metals	Yes	0.00833	mg/l		RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environ	Beryllium	Metals	No	0.0002	mg/l	<MDL	RED_Round1

R_47403712205	05/17/1990	23:59	Field Duplicate	Carbonate as Ca	Conventals	No	1	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Carbonate as Ca	Conventals	No	1	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Alkalinity, Total	Conventals	Yes	100	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Alkalinity, Total	Conventals	Yes	98	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Chloride	Conventals	Yes	2.7	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Chloride	Conventals	Yes	1.8	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Fluoride	Conventals	No	0.2	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Hardness	Conventals	Yes	46	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Hardness	Conventals	Yes	50	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Hydroxide as Ca	Conventals	No	1	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Hydroxide as Ca	Conventals	No	1	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Fluoride	Conventals	No	0.2	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Nitrate-N	Conventals	No	0.2	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Nitrate-N	Conventals	No	0.2	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Silica	Conventals	Yes	34	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Silica	Conventals	Yes	36	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Sulfate	Conventals	Yes	1.6	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Sulfate	Conventals	Yes	1.6	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Total Dissoved S	Conventals	Yes	138	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Total Dissoved S	Conventals	Yes	160	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Total Organic Ha	Conventals	No	5	ug/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Phenol	Endocrine Disru	No	0.005	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	pH, Field	Field parameters	Yes	8.12	pH units		RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Nitrite-N	Conventals	No	0.5	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Nitrite-N	Conventals	No	0.5	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Temperature	Field parameters	Yes	13	deg c		RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Antimony	Metals	No	0.02	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Arsenic	Metals	Yes	0.005	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Arsenic	Metals	Yes	0.005	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Barium	Metals	No	0.003	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Barium	Metals	No	0.003	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Beryllium	Metals	No	0.005	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Cadmium	Metals	No	0.002	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Calcium	Metals	Yes	13	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Calcium	Metals	Yes	14	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Chromium	Metals	No	0.006	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Cadmium	Metals	No	0.002	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Chromium	Metals	No	0.006	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Copper	Metals	No	0.002	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Copper	Metals	No	0.002	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Cyanide	Metals	No	0.005	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Iron	Metals	Yes	0.11	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Iron	Metals	Yes	0.05	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Lead	Metals	Yes	0.001	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Lead	Metals	Yes	0.003	mg/l		RED_historic_R2

R_47403712205	05/21/2001	14:02	Field Replicate	Beryllium	Metals	No	0.0002	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Cadmium	Metals	No	0.0001	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Cadmium	Metals	No	0.0001	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Calcium	Metals	Yes	15.2	mg/l		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Calcium	Metals	Yes	14.6	mg/l		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Chromium	Metals	No	0.0004	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Chromium	Metals	No	0.0004	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Cobalt	Metals	No	0.0002	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Cobalt	Metals	No	0.0002	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Copper	Metals	Yes	0.00045	mg/l	<RDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Copper	Metals	Yes	0.00052	mg/l	<RDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Iron	Metals	Yes	0.068	mg/l	<RDL	RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Iron	Metals	Yes	0.052	mg/l	<RDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Lead	Metals	No	0.0002	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Lead	Metals	No	0.0002	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Magnesium	Metals	Yes	4	mg/l		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Magnesium	Metals	Yes	3.88	mg/l		RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Manganese	Metals	Yes	0.0592	mg/l		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Manganese	Metals	Yes	0.0609	mg/l		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Mercury	Metals	No	0.0002	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Mercury	Metals	No	0.0002	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Molybdenum	Metals	Yes	0.0015	mg/l	<RDL	RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Molybdenum	Metals	Yes	0.0016	mg/l	<RDL	RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Nickel	Metals	Yes	0.00036	mg/l	<RDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Nickel	Metals	Yes	0.00036	mg/l	<RDL	RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Potassium	Metals	Yes	2.6	mg/l	<RDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Potassium	Metals	Yes	2.9	mg/l	<RDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Selenium	Metals	No	0.0015	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Selenium	Metals	No	0.0015	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Silver	Metals	No	0.0002	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Silver	Metals	No	0.0002	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Sodium	Metals	Yes	22.3	mg/l		RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Sodium	Metals	Yes	23	mg/l		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Thallium	Metals	No	0.0002	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Thallium	Metals	No	0.0002	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Vanadium	Metals	No	0.0003	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Vanadium	Metals	No	0.0003	mg/l	<MDL	RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Zinc	Metals	Yes	0.0335	mg/l		RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Zinc	Metals	Yes	0.0367	mg/l		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Coliforms, Fecal	Microbiology	No	0	CFU/100ml		RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Coliforms, Fecal	Microbiology	No	0	CFU/100ml		RED_Round1
R_47403712205	05/21/2001	14:05	Normal Environi	Coliforms, Total	Microbiology	No	0	CFU/100ml		RED_Round1
R_47403712205	05/21/2001	14:02	Field Replicate	Coliforms, Total	Microbiology	No	0	CFU/100ml		RED_Round1
R_47403712205	05/17/1990	23:59	Normal Environi	Bicarbonate as C	Conventals	Yes	100	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Bicarbonate as C	Conventals	Yes	98	mg/l		RED_historic_R2

R_47403712205	05/17/1990	23:59	Normal Environ	Manganese	Metals	Yes	0.084	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Manganese	Metals	Yes	0.089	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Mercury	Metals	No	0.0002	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Mercury	Metals	No	0.0002	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Magnesium	Metals	Yes	3.6	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Magnesium	Metals	Yes	3.4	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Nickel	Metals	No	0.01	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Selenium	Metals	No	0.001	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Selenium	Metals	Yes	0.001	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Silver	Metals	No	0.01	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Silver	Metals	No	0.01	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Sodium	Metals	Yes	28	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Sodium	Metals	Yes	26	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Thallium	Metals	No	0.001	mg/l	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Zinc	Metals	Yes	0.06	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Potassium	Metals	Yes	2.3	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Potassium	Metals	Yes	2.6	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Zinc	Metals	Yes	0.02	mg/l		RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Coliforms, Fecal	Microbiology	No	1	mpn/100ml	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Coliforms, Fecal	Microbiology	No	1	mpn/100ml	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Normal Environ	Coliforms, Total	Microbiology	No	1	mpn/100ml	<MDL	RED_historic_R2
R_47403712205	05/17/1990	23:59	Field Duplicate	Coliforms, Total	Microbiology	No	1	mpn/100ml	<MDL	RED_historic_R2
R_47403712205	12/06/1989	23:57	Normal Environ	Coliforms, Total	Microbiology	No	1	mpn/100ml	<MDL	RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Alkalinity, Total	Conventals	Yes	100	mg/l		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Coliforms, Fecal	Microbiology	No	1	mpn/100ml	<MDL	RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Selenium	Metals	No	0.001	mg/l	<MDL	RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Zinc	Metals	Yes	0.017	mg/l		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Silver	Metals	Yes	0.01	mg/l		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Sodium	Metals	Yes	23	mg/l		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Potassium	Metals	Yes	3.4	mg/l		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Manganese	Metals	Yes	0.055	mg/l		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Mercury	Metals	No	0.0002	mg/l	<MDL	RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Lead	Metals	No	0.001	mg/l	<MDL	RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Magnesium	Metals	Yes	3.6	mg/l		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Iron	Metals	No	0.01	mg/l	<MDL	RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Copper	Metals	Yes	0.013	mg/l		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Calcium	Metals	Yes	13	mg/l		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Chromium	Metals	Yes	0.012	mg/l		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Cadmium	Metals	No	0.002	mg/l	<MDL	RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Barium	Metals	Yes	0.011	mg/l		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Arsenic	Metals	Yes	0.004	mg/l		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Temperature	Field parameters	Yes	10	deg c		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Silica	Conventals	Yes	26	mg/l		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	pH, Field	Field parameters	Yes	7.36	pH units		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Total Dissoved S	Conventals	Yes	210	mg/l		RED_historic_R1

R_47403712205	12/06/1989	23:57	Normal Environ	Total Organic Ha	Conventals	No	5	ug/l	<MDL	RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Sulfate	Conventals	Yes	1.4	mg/l		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Nitrite-N	Conventals	No	0.1	mg/l	<MDL	RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Fluoride	Conventals	No	0.1	mg/l	<MDL	RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Hydroxide as Ca	Conventals	No	1	mg/l	<MDL	RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Nitrate-N	Conventals	No	0.1	mg/l	<MDL	RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Hardness	Conventals	Yes	47	mg/l		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Chloride	Conventals	Yes	5.2	mg/l		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Bicarbonate as C	Conventals	Yes	100	mg/l		RED_historic_R1
R_47403712205	12/06/1989	23:57	Normal Environ	Carbonate as Ca	Conventals	No	1	mg/l	<MDL	RED_historic_R1